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RADIO AMATEURS' JOU

MAY
1953

2nd Special Mobile Issue

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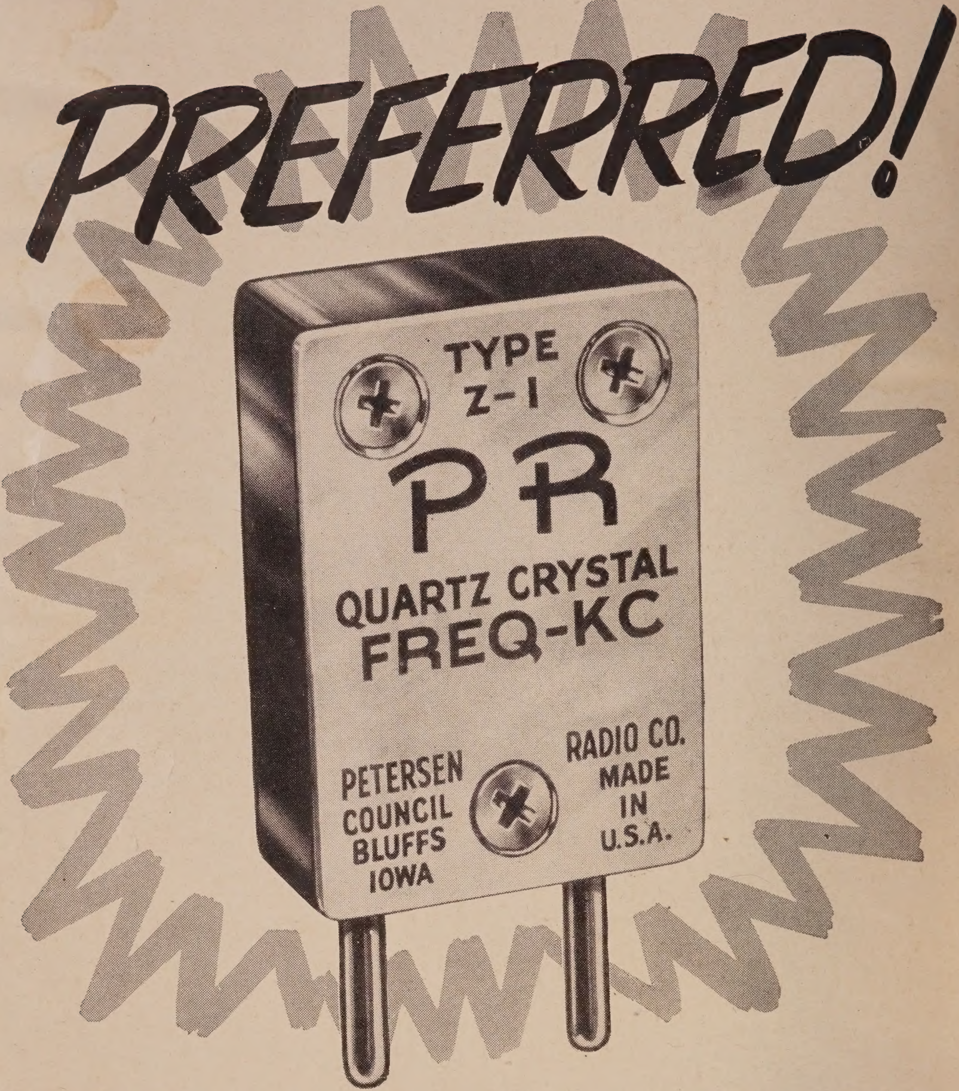
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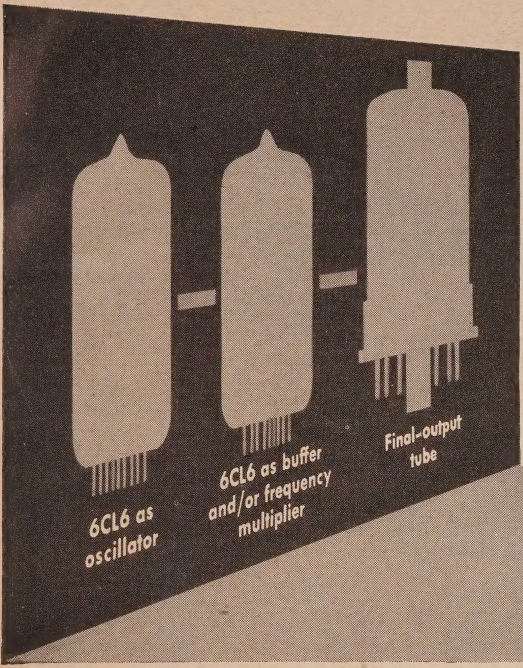
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6CL6 as buffer and/or frequency multiplier
Final-output tube

USE G-E 6CL6 POWER-PENTODE MINIATURES!

POPULAR, versatile type 6AG7 takes a back seat to G.E.'s 6CL6—a new miniature equivalent that will do what the larger tube will do, while occupying but a fraction of the space!

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In a low-power rig, two 6CL6's will handle your r-f unassisted, one as oscillator, the other as amplifier-output tube. For medium power, two 6CL6's will feed the signal into your "big bottle", with the first again serving as oscillator. The second splits the functions of buffer and frequency amplifier, or does either job alone.

Ask your G-E tube distributor to show you the 6CL6! Do your pocketbook a favor by taking advantage of the tube's moderate price! *Tube Department, General Electric Co., Schenectady 5, N. Y.*

6CL6

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Filament Current	.65 amp
Plate Voltage	300 v
Plate Current	30 ma
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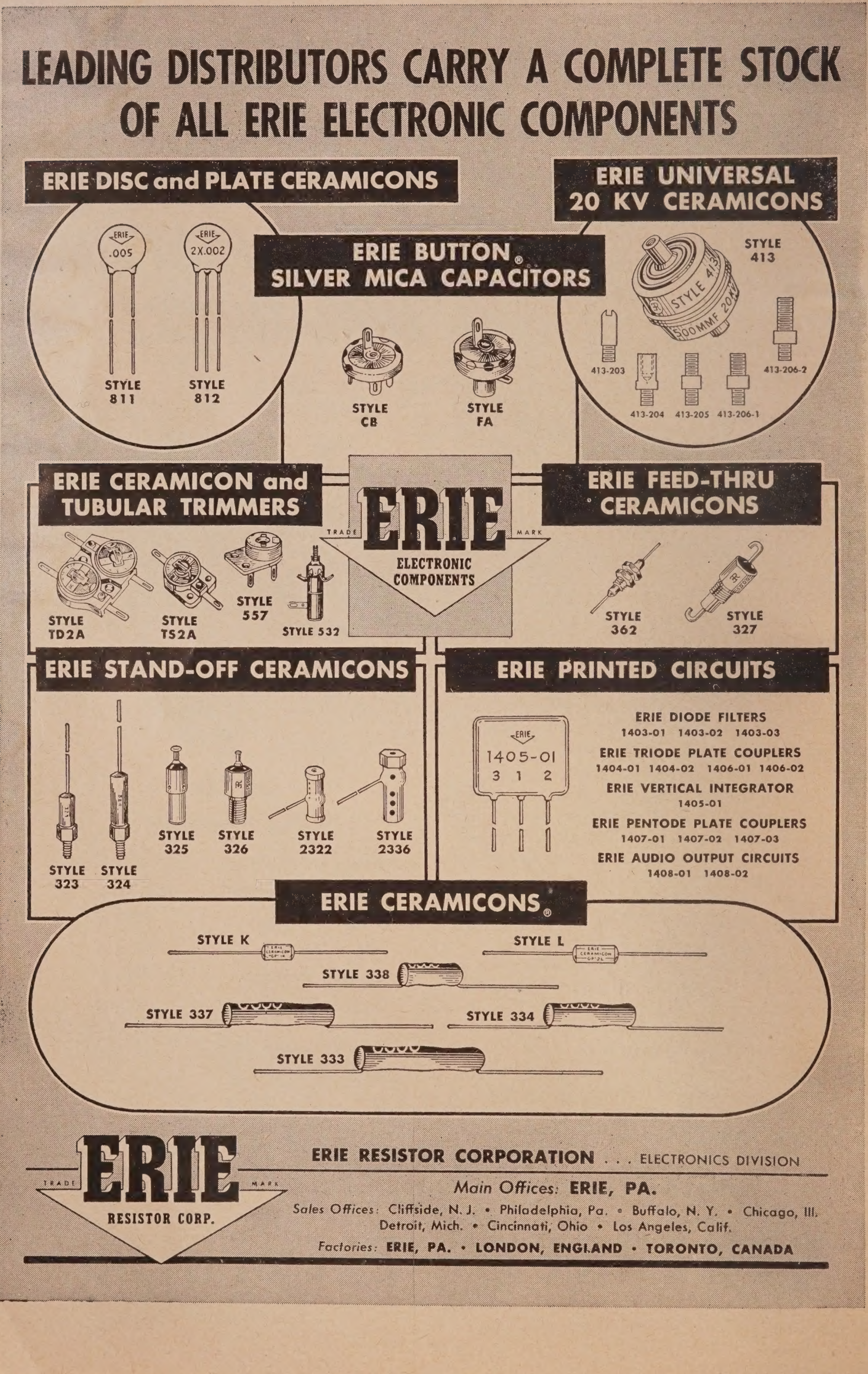

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CQ RADIO AMATEURS' JOURNAL

VOL. 9, NO. 5
MAY, 1953

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Foreign Subscription Representative; Radio Society of Great Britain, New Ruskin House, Little Russel St., London, WC 1, England. Technical Book & Magazine Co., 297 Swanston St., Melbourne C1, Victoria, Australia.
Scandinavian Representative: Intrapress, 17 Nordre Paradisvej, Holte, Denmark

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CQ—(title Reg. U.S. Post Office)—is published monthly by Cowan Publishing Corp. Executive and Editorial offices, 67 West 44th Street, New York 36, N. Y. Phone MUrray Hill 7-2080. Reentered as Second Class Matter February 6, 1951 at the Post Office. New York, N. Y. under the Act of March 3, 1879. Subscription rates in U. S. A. Possessions, APO & FPO, 1 year $3.00; 2 years $5.00; 3 years $7.00. Elsewhere add $1.00 per year for postage. Single copies 35 cents. Printed in U. S. A.

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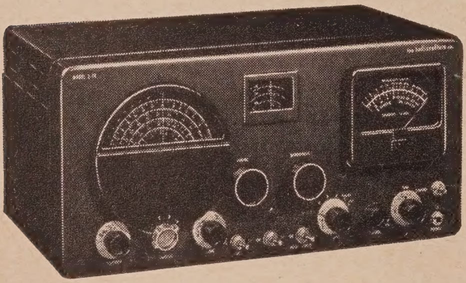

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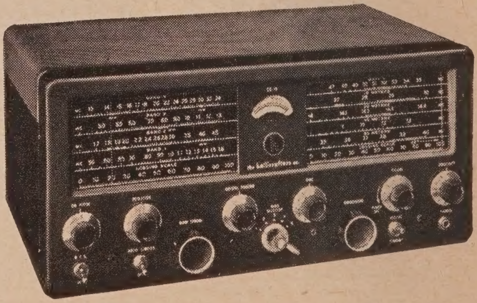

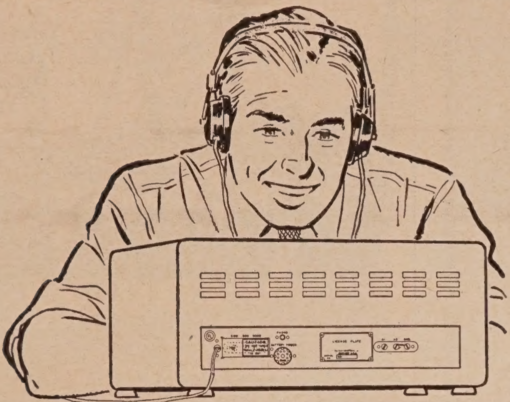

Model S-40B—Covers Broadcast Band 540-1700 kc and three short-wave bands. 1.7-43 Mc. One r-f, two i-f stages. Electrical bandspread tuning. Switches for automatic noise limiter, code reception and three-position tone control. CW pitch control. Built-in PM speaker. 115 V, A.C. Only **$119.95**

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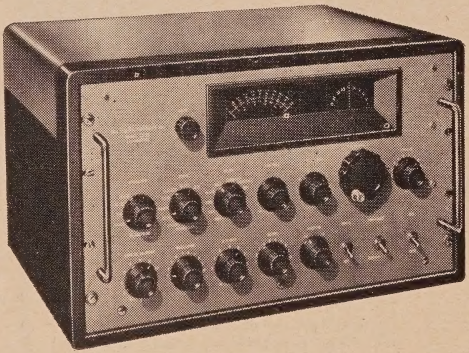
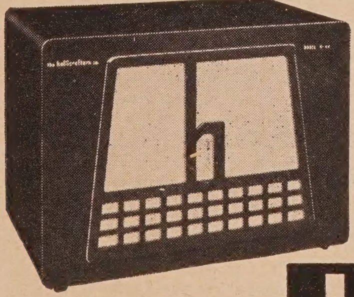
Here's the transmitter you've been waiting for! Continuous coverage from 1.7 Mc to 30 Mc. Full band switching, no more plug-in coils; choice of 10 crystals. Shielded, filtered r-f compartments plus low-pass 52 ohm co-axial line output filter assures at least 90 db suppression of all harmonics above 40 Mc. Only **$449.50**





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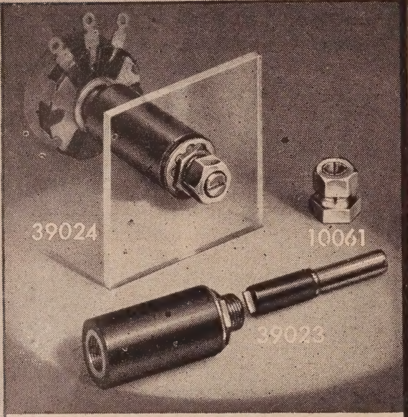

THE No. 39024 LOCK TYPE HIGH VOLTAGE INSULATED SHAFT EXTENSION

Now the Millen DESIGNED FOR APPLICATION No. 10061 shaft locks and the No. 39023 insulated high voltage potentiometer extension mountings are available as a single integrated unit—the No. 39024. The proper shaft length is independent of the panel thickness. The standard shaft has provision for screw driver adjustment. Special shaft arrangements are available for industrial applications. Extension shaft and insulated coupling are molded as a single unit to provide accuracy of alignment and ease of installation.

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Deer Hon. Ed:

You better post-hasty checking with Hon. Uncle Sam and his postoffice departments, on acct. I thinking that some male you sending me resently not arriving. At leastwise, I'm sure you must have ritten to me, asking me to riting 1/c article on mobile radio. Only reason I saying this are knowing that you are abouts to bring out new Mobile Handbook, with eleventeen thousands of pages or somesuch, giving scillions of good ideas to mobile amchoors, and of natchurally you wanting to have article in Handbook by good old Scratchi, the mobile geenyus.

Certainly you remembering that Scratchi are first known Ham to causing twenty-nine car pile-up while using mobile rig in his car? Whoosh—what a mess that were. Or that Scratchi are first amchoor ever to have quarter-kilowhat rig in car for one months without be able to raising anybuddy? And you also knowing, I'm certainly, that Scratchi are first amchoor to working mobile to South America on forty meter phoney band cupple years ago (using second harmonic of eighty meter signal)?

With all that repatashon, no Mobile Handbook would be cumpleat without seeds of geenyus from Hon. Scratchi, you not thinking? On acct. you going to press with Handbook almost immeedjutly, following are some 1/c ideas you wanting to use, I'm surely. I am riting on low-freekwensy mobile antennas because that are major problem facing would-be mobile Hams, and I only intrusted in solving hardest problems.

Scratchi's Slicky Hints on 160 and 80 Meter Mobile Antennas

Antennas for using with mobile rigs on cars are coming in four different types: Screw Them On; Let Them Fly; Let Them Drag; Keep Them Tight.

Screw Them On

These antennas are kind everybuddy having and using. Inklooding all types whips, whether they be bottom-loaded center-loaded or top-loaded.

Scratchi not going say much about these types, as most amchoors already using them. Beside-time, Scratchi still mad at top-loaded antenna ever since I using one in old convertible car I having. Antenna are mounted on back bumper, and one time when slamming on brakes too fastly whip are bending forward and top-load coil are giving Scratchi bad case of coil form in the noggin.

Let Them Fly

A few smart gentlefellows using this type. Idea in back of this type are using wire what are near the rite length for 80 and 160 meters band. Natchurally can't mounting five-houndred feets of wire on car, so

(Continued on page 8)

Back Again by Popular Demand!

STANCOR'S ST-203-A Mobile Transmitter

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ST-203-A MOBILE
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THE COMPACT VERSATILE ST-203-A is again available—because you wanted it. A proven mobile transmitter, Stancor ST-203-A is being used by thousands of hams today.

Designed primarily for mobile operation, the ST-203-A can be used for fixed station service. Specially designed mounting fasteners permit you to operate the ST-203-A in your car and then quickly and easily transfer it to your shack, summer home or other fixed location.

Power is obtained from a dynamotor or vibrator supply for mobile work or from an AC supply at a fixed location. Performs efficiently with the surplus PE-103A dynamotor and T-17B carbon microphone.

Briefly, the circuit lineup consists of a 6V6 harmonic oscillator working from 7 mc. crystals, a 2E26 Class C amplifier, a 6J5 grounded-grid speech amplifier, and a push-pull 6V6 Class A-1 modulator.

Attractively styled in silver-gray hammertone finish with gray plastic control knobs and brushed metal carrying handle. Size only 8⅝" x 7⅜" x 6¾". Weight with tubes and crystals, 9¼ pounds.

The ST-203-A, completely assembled, wired and tested, **AMATEUR NET PRICE,** less accessories **$66.75**

Kit, including prefabricated chassis, mounting plate, dust cover, prepared lead wires, all constructional components and detailed, illustrated instruction manual, **AMATEUR NET PRICE,** less accessories............. **$47.50**

WHAT USERS SAY . . .

"Superb piece of engineering"

"Easily assembled . . . excellent performance"

"The ultimate for mobile use"

"Well pleased . . . not a minute of trouble"

"Keep up the good work"

"Everything perfect first try"

"Another good Stancor product"

NOTE THESE FEATURES:

- 27.5 Watt Amplifier Plate Power Input
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- Both Mobile and Fixed Station Use
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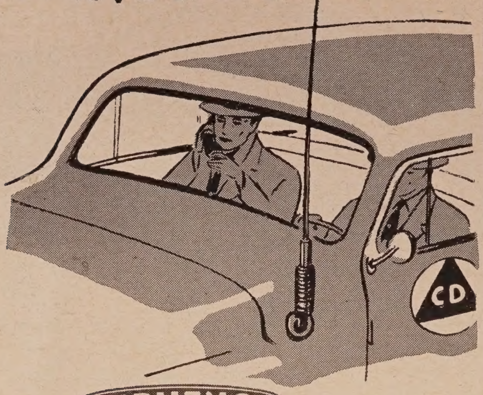

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proven components

Now, when Civil Defense is so important, mobile radio equipment must be built to perform with the same dependability as required by the Military. AMPHENOL Coaxial Cables and RF Connectors—the same components which are being used in Signal Corps and Air Force radio equipment—are available for civilian use. The engineering, fabrication and testing that comprises AMPHENOL production guarantees that these parts can be counted on for top efficiency at any time. The fact that replacements on these severely used components are so rarely needed has given another measure of dependability to their users.

AMPHENOL Coaxial Cables are manufactured of tested materials and have strict end-to-end uniformity. Utilization of low moisture-absorbing polyethylene and Teflon* dielectrics insures low loss. Matching the efficiency of AMPHENOL Cables are the easy to install RF Connectors. These provide excellent impedance match with low RF loss.

**E. I. DuPont reg. T. M.*

see your AMPHENOL dealer
for *Mobile* radio equipment

AMERICAN PHENOLIC CORPORATION
chicago 50, illinois

(from page 6)

throwing it out window and letting fly. Of also natchurally are having to use reel small wire so it can't be seen.

Slicky stunt are putting hunk of sumthing on end of wire so it flying out strate behind car. One amchoor I knowing putting paper drinking cup on end of wire, so wind catching in it. I more liking putting airplain on end of wire. When out in open country can adjusting model airplain so wire getting up to nice altytood. Boy are this putting out signal, I heering. Only time Scratchi trying this I having 500 feets of wire out and coming to where tellyfone lines crossing road. Whammo!! having short antenna like sixty.

Let Them Drag

This are neerly same idea as Let Them Fly, only here you tossing wire out window and letting it drag along the road. Are reel peechy skeem until going around curve or getting into traffick. If having several miles of wire on reel can youshally keeping antenna on rig if unreeling fast when loosing hunks of antenna, espeshully if have friend in car to helping.

Scratchi also working on new skeem what working like dispensers for putting sand under wheels of trucks. Mixing up sand and carbon granyouls and putting in hopper on car, so as driving along leeving thin trail of sand and carbon. Carbon acting as conductor, and sand insulating carbon from road. Connecting output stage to hopper full of the gunk. This are sooper idea, you not thinking? Only trubble can see is if having high wind antenna blowing away fast as laying it down.

Keep Them Tight

This are prolly best idea of all, and only drawbacks are needing two cars. First getting cupple hundred feets of tow-rope, wrapping antenna wire around it, then tying tow-rope on back of front car and front of back car. Getting some fellows to steer back car, and you driving off towing other car. Antenna are nicely in cleer and everything hunky-dory and legal. If local poleesman asking howcome such long tow-rope, just telling him that bum steering other car are not such hots driver, and you not wanting him too close to you.

Aren't those grate ideas, Hon. Ed? I know you will prolly wanting to rush into print in your new Mobile Handbook, Hon. Ed., so I signing off hastily. Just sending check for same to youshowall address if being so kindly.

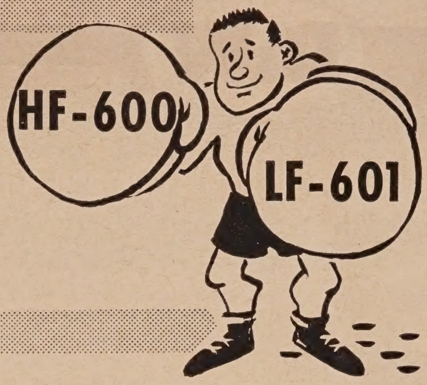
Respectively yours,
Hashafisti Scratchi

Present and Prophetic:

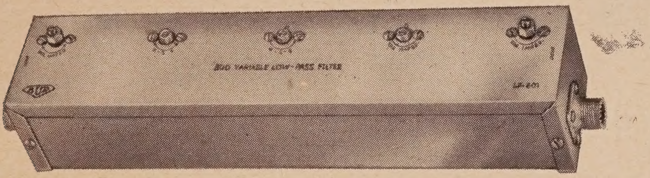
The Fresno Hamfest

The Amateur Radio Club of Fresno, California, extends to you a cordial invitation to join them in the festivities which they've planned for Saturday, May 2nd, at the Fresno Memorial Auditorium. This will be their Eleventh Annual Hamfest, for which they have scheduled a dinner, entertainment, and a prize drawing, among other activities. Obtain your preregistration tickets at $4.50, from Grant Storey, 908 W. Pico, Fresno, Calif.

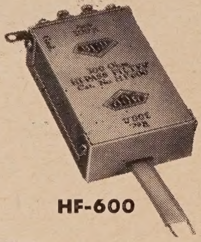
A TWO-FISTED WAY TO BEAT T.V.I.



Television interference may be due to short wave broadcasting stations, amateur radio transmitting stations, diathermy and X-ray equipment, automotive ignition noises or similar sources. The basic problem of eliminating this interference is that of rejection of the signals received from these sources. Interference to television receiver reception caused by transmissions from an amateur station can be caused by harmonics or by shock excitation from the transmitter. The shock from the transmitter fundamental can be cured at the television receiver with a Bud HF-600 high pass filter. Harmonics can be greatly reduced or eliminated at the transmitter by use of a Bud LF-601 low pass filter.



LF-601



HF-600

BUD LF-601 LOW PASS FILTER

Harmonics can be greatly reduced or eliminated at the transmitter by the use of a BUD LF-601 low pass filter, which has the following characteristics:

1. Minimum attenuation of 85 decibels on all frequencies above 54 megacycles and a minimum of 93 decibels above 70 megacycles.
2. Maximum rejection is adjustable from 60 to 90 megacycles. This tunable feature provides two slots at least 100 decibels down on any 2 TV channels.
3. The cut-off frequency is 42 megacycles.
4. The unit will easily handle a full kilowatt modulated on a reasonably flat line.
5. The insertion loss is less than one DB.
6. Since the design of this filter provides an adjustable feature, the unit can be used with either 52 ohm or 72 ohm coax.
7. Each inductance is in an individually shielded compartment.
8. All capacitors used are variable.

Bud LF-601 — Size 12″ x 2½″ x 2¼″ — Amateur Net — $13.95

BUD HF-600 HIGH PASS FILTER

The HF-600 high pass filter is designed to have a cut off frequency at 42 megacycles, thus this filter rejects signals from 0 to 42 megacycles. It is within this range that the majority of signals causing interference would be received. Since there is no attenuation above 42 megacycles, picture strength or quality is not affected. This unit is easily installed on the T.V. set.

Bud HF-600 — Size 3¼″ x 2⅛″ x 1⅛″ — Amateur Net — $3.00

See these efficient filters at your distributors. If he does not have them, write us, giving his name.

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- ★ Wedge-shaped for Easy Access in Hard-to-get-at Places
- ★ Rust Proof Chassis, Sturdy Aluminum Case
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- ★ Powered by 110 V. A.C. Line

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Amateur • Engineer • Service Man
Laboratory Technician • Experimenter

The New B & W Model 600 Dip Meter provides you with a convenient means of doing the job in a minimum of time with dependable accuracy.

It is an extremely sensitive and reliable piece of test equipment having innumerable uses in the Ham Shack, Service Shop, Electronic Laboratory, or Production Plant.

Armed with this versatile and indispensable instrument, you eliminate the guess-work during measurement of—tank circuit frequencies, antennas, feed line systems, parasitics, and other pertinent tuned circuit characteristics, with speed and accuracy.

The handy instruction manual furnished with each instrument covers full information on how to use the Model 600 as an Absorption Meter, Auxiliary Signal Generator, R. F. Signal Monitor, and several special applications as well. See it at all leading electronic parts distributors throughout the U. S. A. and Canada; or write for descriptive bulletin.

BARKER & WILLIAMSON, INC.
237 Fairfield Avenue • Upper Darby, Pa.

Present and Prophetic:

The Big Kennehoochee Hamfest

On Sunday, May 31, 1953, the Kennehoochee Amateur Radio Club of Marietta, Georgia will present their gala annual Hamfest. Scheduled to take place at Lithia Springs, Georgia, the Hamfest agenda features, among other activities, a transmitter hunt, swimming, and a barbecue to renew your energy. There will also be a prize drawing, during which a Johnson Viking II Transmitter (wired) will be awarded on an adult admission ticket. Admission, for adults, will be $2.75, and for children under twelve, $1.50. Tickets may be obtained in advance from R. B. Pledger, W4UPG, 208 McCord St., Marietta, Ga.

4th Annual U.A.R.C. W3PIE Gabfest

The Uniontown Amateur Radio Club W3PIE will sponsor, on Saturday, June 6, 1953, the occasion of their Fourth annual gabfest, which will be held at the club grounds on the old Pittsburgh Road. You are heartily welcomed to attend this lively meeting, the program of which includes auctions, movies, plenty of refreshments, and a prize drawing. Don't miss it.

The Greater St. Louis Hamfest

On Sunday, May 31, The Greater St. Louis Hamfest will be held, at the "Creve Coeur Farmer's Club," 2 miles west of highway 66 on Olive St. Red. in St. Louis County. The Hamfest committee has planned an extensive program of entertainment, which will include games for men, women and children, dancing, and numerous prize awards. Several attendance prizes will be given, although your presence will not be required for the final prize drawing. Admission will be $1.00, and children with parents will be admitted free. A cordial invitation is extended to you and your friends to join in the fun.

The Neosho Valley Hamfest

The annual Ham picnic of the Neosho Valley Amateur Radio Club will be held during Sunday, May 24th, at the Osage City Fair Grounds at Osage City, Kansas. It is not a convention, but a good old get-together picnic, and a program of entertainment has been planned which includes prizes and games. The location at the Osage City Fair Grounds offers plenty of space under cover in case of rain. If you are 75-meter mobile, there will be a transmitter on the air to steer you in. All Hams, their XYL's and kids are invited to come and spend the day. Please bring your own sandwiches and potato salad; coffee and doughnuts will be provided free. Registration is practically free, too, at 50 cents. The committee tells us that there will also be display space available for dealers at no charge.

O. A. R. A. Convention

The Oregon Amateur Radio Association will hold their 1953 Convention in Salem's Marion Hotel this coming May 23rd and 24th. They are offering a full program of entertainment for visiting amateurs which includes lectures by eminent authorities, contests, equipment displays, swap and shop room, etc. The prize list begins with a Johnson Viking II, wired and ready to operate, plus dozens of other valuable items. The registration fees are, for General and Advanced class amateurs, $7.00; Novice class, $5.00; and other non-licensed persons, $3.00. Pre-registration begins immediately.

THE *New* ELMAC PMR 6-A RECEIVER

Designed by Amateurs . . . for Amateurs!

ELMAC
MODEL
PMR-6A
1
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PORTABLE MOBILE RECEIVER – 6 BANDS A (AMATEUR COVERAGE)

Announcement in February of this new 10-tube, dual-conversion receiver has brought terrific demand. This is to tell you that we are leaving no stone unturned in order to promptly deliver this wonderful new receiver in quantity. If your dealer already has your order, your PMR-6A will be delivered soon. If you haven't ordered one of these really NEW receivers yet, do so today!

- 6 Bands
    - (1) 600 kc to 2000 kc. (Broadcast and 160 meter band)
    - (2) 3.5 to 4.0 Mc. (75 and 80 meter band)
    - (3) 6.9 to 7.4 Mc. (40 meters)
    - (4) 13.95 to 14.45 Mc. (20 meters)
    - (5) 20.95 to 21.65 Mc. (15 meters)
    - (6) 28 to 29.7 Mc. (10 meters).
- Dual-Conversion eliminates images. 1600 kc first I.F. 455 kc second I.F.
- Ten tuned circuits provide high selectivity.
- Built-in highly effective noise limiter.
- Built-in Beat Frequency Oscillator.
- Full 3½ watts audio output with less than 1 microvolt signal.
- Tuned R.F. ahead of converter on all bands.
- Voltage regulated to local oscillator, BFO, and second converter.
- Temperature compensated separate oscillator tube for high stability.
- Black back-ground dial gives full vision but does not blind the mobile operator at night.
- AVC "on-off" switch located on front panel.
- Antenna input designed to match 50 ohm coax.
- Power requirements: 6 volts A.C. or D.C. at 3.3 amperes. 250 volts D.C. at 90 milliamperes.
  Power supplies available for 6 and 12 V.D.C. or 115V. AC.
- Cabinet finished in grey hammertone size 4½" H. x 6" W. x 8½" Deep.
  Weight: 6½ pounds.
- Uses 10 tubes.
    - 1—6BJ6 R.F. Amplifier
    - 1—6BE6 First Converter
    - 1—6C4 Local Oscillator
    - 1—6BE6 Second Converter
    - 2—6BJ6 First and Second I.F. Amplifier
    - 1—6AL5 Detector and Noise Limiter.
    - 1—12AT7 First Audio and B.F.O.
    - 1—6BK5 Audio Output
    - 1—OB2 Voltage Regulator
- Price: $134.50

MULTI-PRODUCTS CO., 559 East Ten Mile Road, Hazel Park, Michigan

IDEAL FOR MOBILE Eimac 4-65A

AN EVER INCREASING NUMBER of amateur radio operators are finding that they can take Eimac quality on the highways with them by employing Eimac 4-65A radial-beam power tetrodes in their mobile transmitters. Physically and electrically the 4-65A is ideal for mobile. It is small, compact, rugged, radiation cooled; has a high power gain and requires low driving power and simple circuit design. But one of the best of many features is that through application of filament and plate power simultaneously warm-up periods are eliminated. Also there is no costly battery drain during stand-by periods because the thoriated tungsten filament heats instantly. Although the smallest of Eimac's complete tetrode line, it contains the Eimac specialties of non-emitting Y3 grid wire, *pyrovac** plate, input-output shielding and thoriated tungsten filament.

TYPICAL MOBILE OPERATION

Plate modulated radio frequency amplifier.

DC Plate Voltage	600 volts
DC Screen Voltage	250 volts
DC Grid Voltage	—100 volts
DC Plate Current	117 ma
Driving Power	2 watts
Plate Power Input	70 watts
Plate Dissipation	20 watts
Plate Power Output	50 watts

Investigate the possibilities of the Eimac 4-65A on the new 40 meter phone and other bands by writing our Amateurs' Service Bureau for additional information.

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ZERO BIAS

EDITORIAL

Yes—Another "Mobile Issue"

There are certainly no qualms on our part in presenting the "2nd Special Mobile Issue." The reader reaction to the first "Special Mobile Issue" was so outstanding that the staff has been working for six or seven months assembling the material for this issue of *CQ*. We hope you like it. Don't forget, we are still interested in your comments on more "Special Issues" on other subjects.

By the way, in case you haven't previously realized the true story, these "Special Issues" are only possible because of your support of the *CQ* advertisers. If you see something advertised in *CQ* that you like, or want to buy, or even want information on, don't forget to say that you saw it in such and such an issue. It's very important if you want bigger and better copies of *CQ*.

Things to Come

During the summer months (particularly July and August) a small percentage of newsstand buyers of *CQ* will forget to pick up their copies. Obviously, we would like to have all readers as paid subscribers since this insures that you will get each and every copy. But since some of the fellows lack the necessary funds for an immediate investment let me outline some of the articles scheduled for the next few months.

The "Piggy-Back" is a little cascode pre-amplifier using a 6BQ7 for 2, 6 or 10 meters. It is so simple that I'm afraid I could describe it in this paragraph and get away with it. . . . W6SAI has his TVI-proofing of the Collins 310B coming up. . . . The "Moniscope" is scheduled for early publication. It is a new type of oscilloscope for monitoring your, or the other fellow's, transmissions. . . . VHF transmitters come up for discussion with a compact 144-Mc unit by W2SPV and an SCR-522 conversion to 220-Mc by W5AJG. . . . W3FQB evaluates plate and screen modulation with some interesting and straightforward results. . . . W1VJV describes a novel CW monitor and W4LW tells us more about the "True-Matcher" and automatic antenna tuners.

Well, that scratches the surface, but let's not forget the regular departments and other features. Even if you don't get a chance to read it when you buy it, save those summer issues for the chilly fall nights.

A New Form of "Twig Pruning"

Not too long ago we received an apology from the author of an article that was currently appearing in *QST*. Inasmuch as, several months before, we had the opportunity to read his manuscript, the author wanted to reassure us that he had not altered his text to remove appropriate footnotes and references to earlier work that had appeared in *CQ*.

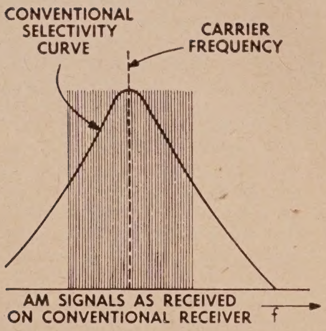
A little study of the back issues of *QST* revealed that this situation was apparently not very uncommon. In fact, the only footnote reference to *CQ* that could be found without extensive searching appeared nearly 15 months ago and concerned an article in *CQ* by the Chief Engineer of a prominent *QST* advertiser. Possibly somewhat more interesting than the deletion of *CQ* references was the fact that mention of this situation had been made at several ARRL Board of Directors meetings. In fact it had been broadly inferred that it would be desirable to see such practices brought to a halt. Footnotes and references often form a valuable part of the background of many technical articles, and the possibility that either *QST* or *CQ* would publish all the material on any one subject was certainly quite remote.

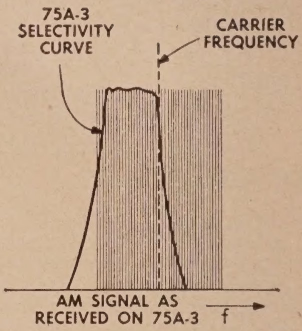
Nevertheless, the policy of *only* referring to *QST* articles continues unabated. It seems that, eventually, *QST* hopes everyone will get the idea that *QST* ran the first, if not the only. article on every single subject in Ham radio. This is a "subtle" way of encouraging authors to submit their material to *QST* so that they may obtain lasting or continued credit for their work. Obviously, under this policy, an article in *CQ* will be completely ignored until one of the ARRL staff has had a chance to modify the design and bring out his own or the *QST* version. Readers that would care to dispute this particular fact need only look through the past five months of both magazines to see the difference in footnote references between the two publications, as well as the history of several equipment designs.

Regardless of the poor ethics being clearly demonstrated in this situation the eventual loser is the individual radio amateur. This is true whether he enjoys radio as a strict hobby, or whether he works at radio 24 hours a day. In either case, the current attitude of attempting to minimize his intelligence just wastes so much valuable time. We may assume that *QST* is an authority in its field, but does it need "twig pruning" of this sort to maintain its growth?

o.p.f.

COPY THOSE MOBILE SIGNALS ON A COLLINS 75A-3


CONVENTIONAL SELECTIVITY CURVE
CARRIER FREQUENCY
AM SIGNALS AS RECEIVED ON CONVENTIONAL RECEIVER
f


75A-3 SELECTIVITY CURVE
CARRIER FREQUENCY
AM SIGNAL AS RECEIVED ON 75A-3
f

You can copy that weak mobile easier with a 75A-3.

Better than a 10 db signal to noise ratio and 1 watt of audio output are obtained on all bands with signal inputs of 2 microvolts.

Because of its nearly ideal selectivity curve, the Collins 75A-3 does not tune like an ordinary receiver. Instead of centering the selectivity curve on the carrier as is usually done when copying AM phone signals on a conventional receiver, the 75A-3 is tuned to one of the sidebands as shown above. When tuned in this manner, the flat-topped selectivity curve of the 75A-3 passes the same audio bandwidth as a conventional receiver that is approximately twice as broad as the 75A-3! The narrower bandwidth of the 75A-3, made possible by the new Collins mechanical filter, pays big dividends when copying those weak mobiles on our crowded ham bands.

We have prepared a descriptive booklet on the 75A-3 and the new Collins mechanical filter. Write for your copy today; or better yet, see your nearest Collins distributor for a demonstration.

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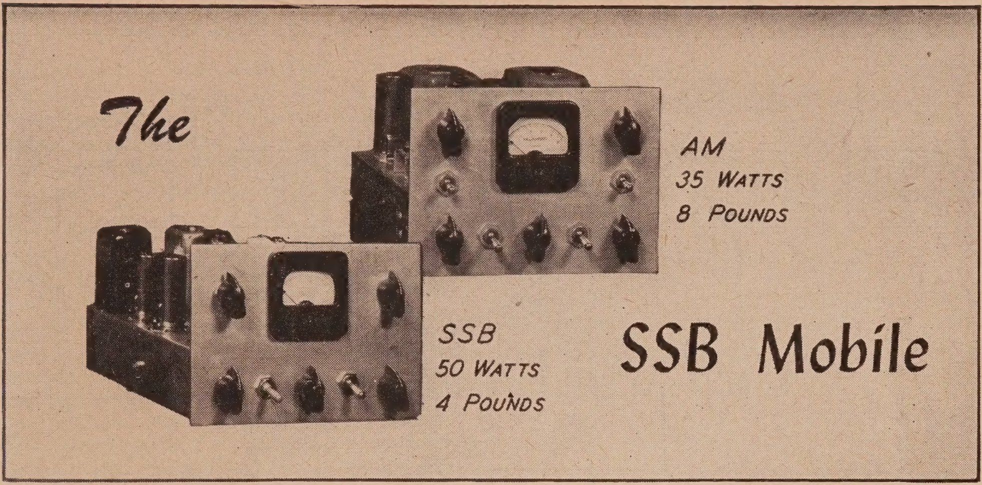
The SSB Mobile



LEONARD POOLE, W4RKE
Box 2027, Herndon, Va.

JACK N. BROWN, W4OLL
Box 303, Herndon, Va.

EARL E. FERGUSON, W4SIA/OX3BI
c/o Ionosphere Station, APO 858, Postmaster, New York, N. Y.

The title photograph of this story may be somewhat confusing since this is actually one of two different transmitters designed to be interchangeable. When used in place of the AM transmitter, the SSB MOBILE features automatic receiver carrier reinsertion on SSB reception, carrier reinsertion in transmitter to enable the "uninitiated" to copy on AM and crystal control rubbering of approximately five kilocycles—Editor.

"Single-sideband operation in a car? Don't be ridiculous!" That is the usual reply when mobile SSB operation is proposed. It seems that some of the boys have trouble receiving a conventional signal when they are bounding along. We'll have to admit that SSB operation in the family car appeared a little farfetched when it was first considered. The transmitter problem didn't seem impossible, but *UGH!* trying to hold a receiver still with the usual auto vibration so that an SSB signal could be read—that was too much.

Receiving a la Highway

What choices do we have in mobile SSB receiving methods? The conventional method would be to furnish a BFO signal at either the i.f. of the *Gonset* converter (1440 kc.) or at the i.f. of the car's broadcast receiver (usually 455 kc.). This would mean, in the first case, that any variation in the frequency of the *Gonset* high-frequency oscillator would cause garble in the received signal, and, in the second case, any variation in either the *Gonset* or the broadcast h.f. oscillators, would garble the signal (certainly to be considered double trouble). An alternative would be to crystal control the high frequency oscillator in the *Gonset* for stability. This idea was immediately discarded, because it tied the car up for single frequency reception, and didn't permit tuning the remaining parts of the band. The one remaining method would be to insert a carrier into the front end of the *Gonset* at the signal frequency. This would again require crystal stability. The prospects of building an oscillator and shielding it well enough so that it would not completely block the receiver were a little hopeless. The desirable thing would be to have an adjustable amount of carrier reinsertion available that could be variable in frequency as well as in amplitude.

There were, of course, "crystal stretcher" circuits that permitted moving the oscillating frequency of a quartz plate a few kilocycles and, after all, the SSB gang *did* haunt the top part of the 75-meter band. The blocking problem, however, was still there—and then the light dawned. Why not make the transmitter furnish the signal necessary to receive other SSB stations? Since the filter transmitter decided upon used heterodyning methods to get the SSB signal up to the 4-Mc amateur phone band, there were no oscillators actually running at the signal frequency (see block diagram, ***Figure 1***). This would mean that both the low frequency crystal oscillator and the high frequency heterodyning crystal oscillator would have to operate when you were receiving—that's easy, take some plate voltage from the already overloaded broadcast receiver!

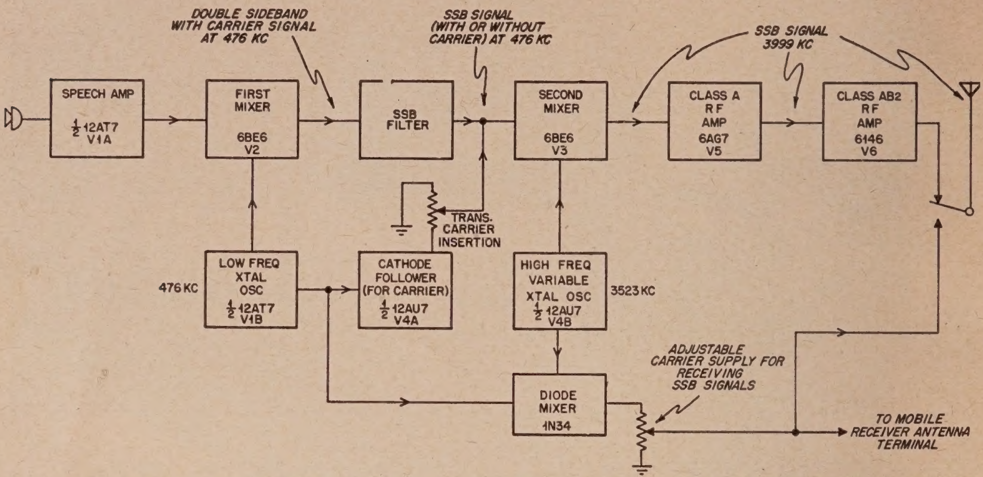

DOUBLE SIDEBAND WITH CARRIER SIGNAL AT 476 KC
SSB SIGNAL (WITH OR WITHOUT CARRIER) AT 476 KC
SSB SIGNAL 3999 KC
SPEECH AMP ½ 12AT7 V1A
FIRST MIXER 6BE6 V2
SSB FILTER
SECOND MIXER 6BE6 V3
CLASS A RF AMP 6AG7 V5
CLASS AB2 RF AMP 6146 V6
TRANS. CARRIER INSERTION
476 KC
LOW FREQ XTAL OSC ½ 12AT7 V1B
CATHODE FOLLOWER (FOR CARRIER) ½ 12AU7 V4A
HIGH FREQ VARIABLE XTAL OSC ½ 12AU7 V4B
3523 KC
ADJUSTABLE CARRIER SUPPLY FOR RECEIVING SSB SIGNALS
DIODE MIXER 1N34
TO MOBILE RECEIVER ANTENNA TERMINAL

Fig. 1. Block diagram of the mobile single sideband transmitter.

Since only a few microvolts were necessary for demodulating the carrier signal the simplest mixer, 1N34 diode was used. A potentiometer was put in series with it to permit adjusting the amplitude of the reinserted carrier. With our scheme, we still had the problem of tuning around. The solution was reached by using a crystal stretching circuit in the transmitter, that would provide at least a few kilocycles tuning range in the desired portion of the band. This method in no way ties up the receiving equipment, nor prevents it from being used in the usual manner. At last we had what seemed a feasible receiving system. The only remaining problem was to incorporate it in the restricted space allotted for the transmitter. (Quick, Henry, the printed circuits!)

Simple Filter Used

Since the mobile SSB unit would not usually be heard with nearly the same strength as the home transmitter, it was felt that the rigid sideband suppression standards of the more elaborate lay-outs could be relaxed for the sake of simplicity. The simplest SSB filter configuration that would give at least 25 db. of sideband suppression was the one described by Edmunds, W1JEO. For simplicity it was decided to use provisions for transmitting only the lower sideband. This would require three FT-241 surplus crystals for the filter itself, and one additional crystal for the low-frequency crystal oscillator used in generating the low lever signal. The authors do not intend to dwell upon the filter as that has been fully treated in the reference *(p. 21)*. A few suggestions will be made later, however. Careful step-by-step alignment as outlined will produce a satisfactory filter. It is suggested that a BC-221 frequency meter be used in the alignment procedure so that accurate frequency-versus-amplitude adjustments are realized.

The "How" of Making it Work

Let us consider how the SSB signal is generated and amplified. Follow along, using the block diagram, *Fig. 1,* and the complete schematic, *Fig. 2.* Tube *V1A* is half of a dual triode and serves as a speech amplifier for the single button carbon microphone. The output of the speech amplifier is fed into the signal grid of the first mixer tube, *V2,* where it is combined with an r-f signal from the low-frequency Pierce crystal oscillator, *V1B.* In the plate circuit of *V2* we have a double-sideband with-carrier signal that is familiar to all of us. This signal is then fed through the sideband filter, where the carrier is attenuated and the upper sideband is attenuated to the tune of 25 db. Coming out of the filter we have remaining the lower sideband and no carrier. In the transmitter described the low-frequency carrier was at approximately 476 kilocycles. The lower sideband occupies the next lower three kilocycles in the spectrum.

The problem remaining is to heterodyne this SSB signal up to some amateur band where it can be put to use. This is handled by another mixer tube, *V3,* and another oscillator tube, *V4b.* Again, the SSB signal is fed into the signal grid, and the mixing oscillator signal is fed into the oscillator grid. The choice of frequency for the heterodyning oscillator is easy. First, decide what the final operating frequency is to be. Then, subtract the carrier frequency of the low frequency single sideband signal from this number, and the difference is the frequency of the heterodyning oscillator. In the particular transmitter described, operation on 3999 kc. was desired, so 3999 minus 476 equals 3523 kilocycles. Therefore, when the 3523-kc oscillator signal and the 476-kc SSB signal are mixed in *V3,* the sum produced in the plate circuit is an SSB signal, with its suppressed carrier frequency at 3999 kilocycles.

Now that the signal is at the desired signal frequency, it must be amplified to a sufficiently high level to be radiated from the mobile whip. Since SSB signals are composed of r-f voltages of varying frequencies *and* amplitudes, it will be necessary to amplify them in linear amplifiers. Don't get panicky now, linear amplifiers are more common in the Ham shack than you think. Your receiver and modulator are full of them. The two stages used as amplifiers in this mobile transmitter are a 6AG7 in Class A and a 6146 in Class AB2.

Construction and Layout

Since the existing AM mobile transmitter was built on a 7″ x 7″ x 2″ chassis, we were compelled to use a similar chassis for the SSB rig or face the necessity of rebuilding the car mount. Since use of both transmitters was desired, the latter idea wasn't feasible.

Care should be taken in the layout near the crystal filter. All components should be rigidly mounted so that circuit capacity that might affect the filter alignment cannot change once final adjustment is made. The remainder of the circuits are more or less conventional and should not cause any trouble. To save space, disc ceramic condensers were used for all bypass and coupling condensers, wherever possible. Some intelligent planning will result in a compact unit, without resorting to some of the more advanced jeweler's techniques, or to the use of printed circuits. It is recommended that reasonably close adherance to the layout shown in the photographs and in *Fig. 4* be followed.

If construction in this size chassis is not contemplated, other methods may be used, as long as care is taken to prevent leakage around the crystal filter unit. This is important, as it directly affects the sideband suppression of the signal.

Circuit Details and Functions

To understand "what cooks" just a little better, follow the complete schematic, *Fig. 2,* as we give it the "once over lightly". *V1A,* the speech amplifier, is operated grounded grid. If you desire to use a microphone transformer in this stage, it may be hooked up in the conventional way; however, the cathode bias resistor, *R1,* should be increased to 2200 ohms, and the bottom end grounded directly. Confidentially, we couldn't find room for the transformer, hence, the grounded grid arrangement. A 12AU7 tube was first tried as *V1,* but there was insufficient audio gain, so the 12AT7 was substituted. The 12AT7 is noted for short cathode emission life. If this trouble is encountered, a ruggedized version of the 12AT7 is available in the type 12AV7. The retail price is about double that of the 12AT7.

The other half of this tube, *V1B,* serves as the carrier generator in the first mixing or modulating process. It is a conventional Pierce circuit, using a 100K resistor, *R5,* for the plate load. If oscillation of the low frequency crystal is erratic or sluggish, *C7* may be added from plate to ground to change the ratio of the capacitive feedback voltage divider, which is partially comprised of the tube capacities. This condenser should be made as small as possible, commensurate with reliable operation. Too much feedback will damage the crystal.

The first mixer, *V2,* is a 6BE6, and operates just as it would in a receiver. The signal to be heterodyned is fed into the signal grid, *pin 7,* and the oscillator signal from *V1B* into the oscillator grid, *pin 1.* The mixture appears in the plate circuit as the oscillator frequency plus and minus the signal frequency, or in simpler words, the carrier with both upper and lower sidebands hanging on it. The amount of oscillator injection into *pin 1* of the mixer should be in the range of from 6 to 10 volts r.m.s. as measured on a VTVM with r-f probe.

The filter will be dealt with in more detail later, but it would be well to mention here that a slight modification of the compression trimmer condenser on the secondary of *Ta, Fig. 3,* might be necessary. This is made necessary because of the addition of the two center tapped condensers, *Ca* and *Cb, Fig. 3,* which increase the effective tuning capacity. If it is found that the tuning of the secondary of *Ta* is beyond the range of the trimmer, a plate may be easily removed, bringing the tuning within the range of the condenser, assuming, of course, that there are more than two plates in the trimmer to begin with!

After passing through the filter, the signal (now SSB) goes to the signal grid of the second mixer, *V3,* another 6BE6. The process is the same; only the frequencies are different. This time the oscillator mixing signal is furnished at 3523 kc., and the signal to be heterodyned is the group of r-f voltages making up the lower sideband signal near 476 kc. Again in the plate circuit of this second mixer the signals present are the oscillator frequency plus and minus the SSB signal frequency. However, these three signals are all separated by at least 476 kc., and a tuned circuit will easily select the one we want. In our case we want the one which is the oscillator frequency *plus* the SSB signal, or 3523 *plus* 476 kc. This puts us on 3999 kc., and still with a *lower* sideband. A little thought will show that if we had chosen the other mixture (3523 kc. *minus* 476 kc. SSB) we would have had an *upper* sideband signal on 3047 kc. Since this is not in an amateur band, we suggest that no effort be made to use it!

A few words about the high frequency crystal oscillator are in order about here. The grid circuit of this stage, *V4B,* is slightly unconventional. The series tuned circuit of *L2* and *C16* are used to move the oscillating frequency of the 3.5-Mc crystal around a bit. The values of the inductance and the capacities of the crystal holder and variable con-

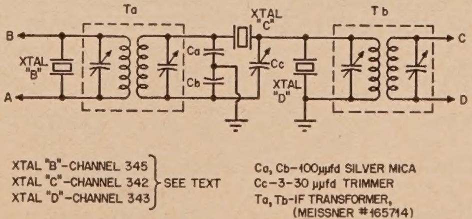


Fig. 3. Wiring schematic of the sideband and carrier crystal filter.

Coil Winding Data

L1—2.5 mh., 100 ma. r-f choke
L2—130 turns #36 formex wire wound on National XR-50 slug-tuned form
L3—45 turns #28 formex wire wound on National XR-50 slug-tuned form
L4—26 turns #18 formex wire on 1½" plug-in form
L5—4 turns #18 formex wire on 1½" plug-in form

denser are such, that, when the net reactance is slightly inductive, the crystal frequency will be pulled *downward* from its normal oscillating frequency. Upon reduction of the variable capacitor to its minimum value, the oscillating frequency will return to the natural frequency of the crystal. Please note that if the crystal frequency is pulled more than about five kilocycles at the frequency used, the oscillator will continue to function but the crystal will lose control as the frequency controlling element. The circuit then operates as a low grade of series-tuned self-excited oscillator, thus it is recommended that the crystal pulling be restricted to no more than five kilocycles.

Alignment

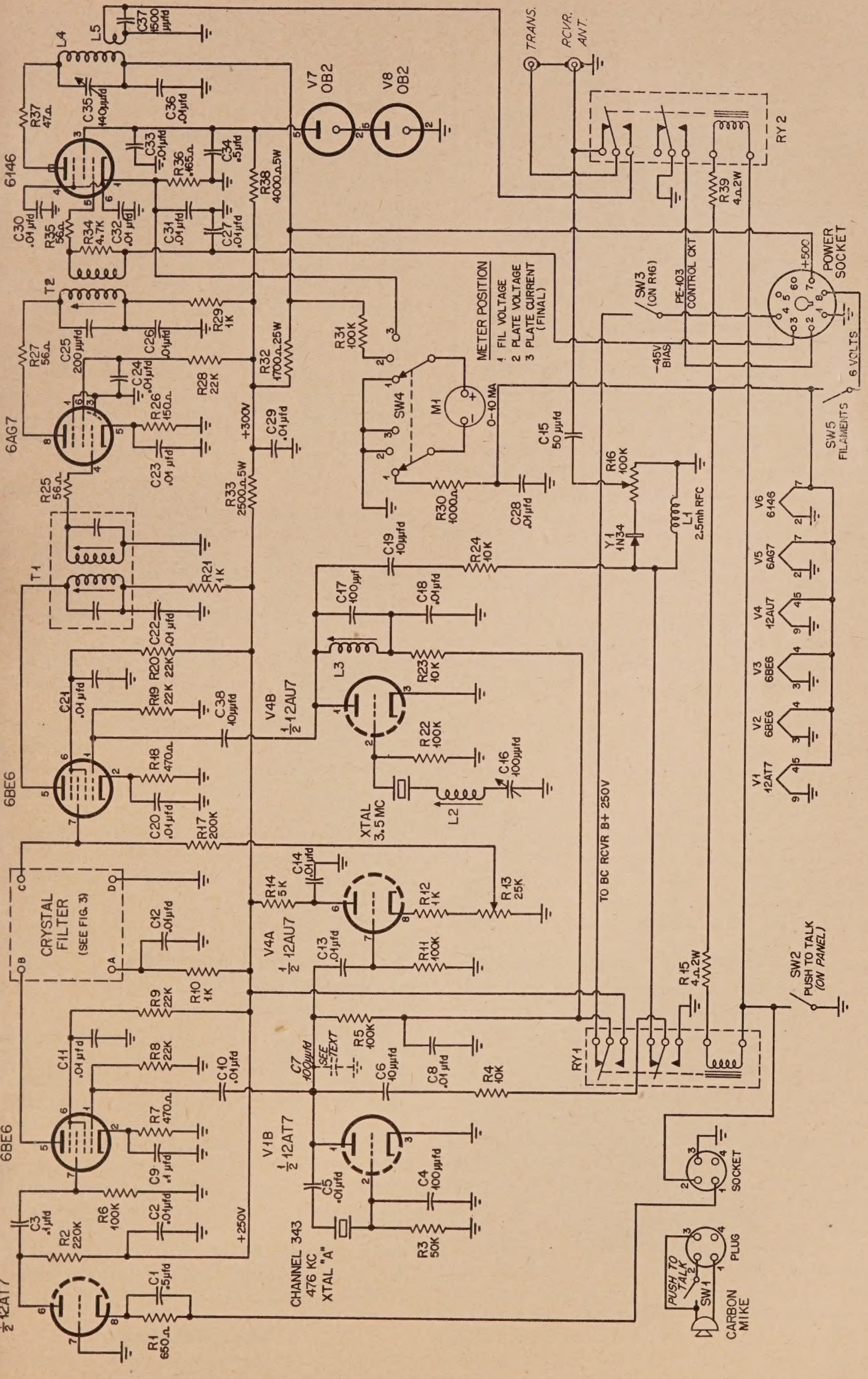
The alignment of this circuit is as follows: With the crystal pulling condenser, *C16*, at ***minimum*** setting, adjust the plate tank of the oscillator, *L3*, for oscillation. The crystal used in this circuit must be reasonably active. Tune in the signal on a receiver and make the following adjustments. Turn *C16* to ***maximum*** capacity and adjust the slug in *L2* until the oscillation frequency of the crystal is approximately 5 kc. below where it was with *C16* at minimum capacity. Once this adjustment is made, all QSY is done by turning *C16* for the desired frequency. The stability of this circuit is very good. One precaution, however, is necessary. Hand capacity to the crystal holder will change the effective circuit capacity, so it is recommended that the crystal be mounted out of the way where stray capacities would not be liable to affect it.

The second mixer, *V3*, is coupled to the 6AG7, *V5*, through a miniature 4.5 megacycle f-m sound transformer which is tuned to the 4.0-Mc band. No modification of this transformer was necessary. Cathode bias is used on this stage as straight Class A operation is used and no swing in plate current is encountered. Ordinary precautions in isolating the grid and plate circuits of this stage will prevent any tendency toward oscillation. The plate circuit of the 6AG7 is fed into a tuned primary-untuned secondary transformer, *T2*. This transformer is wound on a *National XR-50* coil form. The secondary is wound on top of the primary winding and is insulated from it by a layer or two of Scotch plastic electrical tape. The secondary is connected to the grid of the 6146 amplifier, *V6*. The final tank circuit is conventional in every respect, except that it was insured that enough effective tank capacity would be used to guarantee a good operating Q in the tank circuit under loaded conditions. The 4700-ohm resistor, *R34*, across the secondary of the driver transformer, *T2*, was found necessary to discourage regeneration in the final stage. It also serves to stabilize the load impedance presented to the 6AG7 when grid current is drawn by the 6146. Sufficient gain must be realized with absolutely no trace of instability, which is usually indicated by erratic flicks in the plate meter as various circuits are tuned. These spurious signals may be easily identified in a receiver—usually near signal frequency.

Grid bias for the 6146 final amplifier is furnished by a miniature 45-volt hearing aid battery. As the grid current is very low, the battery should have practically shelf life. It is impossible to use cathode bias in this stage as we did in the 6AG7, because the plate current swings over a large range with speech input and the cathode bias would go to a

Fig. 2. Wiring schematic and parts of the SSB MOBILE.

C1—0.5 μfd. 200v., metallized paper
C2, C5, C8, C10, C12, C13, C14, C18, C20, C21, C22, C23, C24, C26, C27, C28, C29, C30, C31, C32, C33, C36—0.01 μfd., 600v. disc ceramic
C3—0.1 μfd., 400v. metallized paper
C4, C7, C17—100 μμfd., 500v. mica
C6, C19, C38—10 μμfd., 500v. mica
C9—0.1 μfd., 200v. metallized paper
C15—50 μμfd., 500v. mica
C16—100 μμfd. variable, Hammarlund HF-100
C25—200 μμfd., 500v. mica
C34—0.5 μfd., 400v. metallized paper
C35—140 μμfd. variable
C37—1,500 μμfd., 500v. mica.
R1—650 ohms, 1w.
R2—220,000 ohms, 1w.
R3—50,000 ohms, 1w.
R4, R23, R24—10,000 ohms, 1w.
R5, R6, R11, R22—100,000 ohms, 1w.
R7, R18—470 ohms, 1w.
R8, R9, R19, R20, R28—22,000 ohms, 1w.
R10, R12, R21, R29—1,000 ohms, 1w.
R13—25,000 ohm potentiometer
R14—5,000 ohms, 1w.
R15, R39—4 ohms, 2w.
R16—100,000 ohm potentiometer with switch
R17—200,000 ohm, 1w.
R25, R27, R35—56 ohms, 1w.
R26—150 ohms, 1w.
R30—1,000 ohms, 5%, 1w.
R31—100,000 ohms, 5%, 1w.
R32—1,700 ohms, 25w.
R33—2,500 ohms, 5w.
R34—4700 ohms, 1w.
R36—0.165 ohms (special, see text)
R37—47 ohms, 1w.
R38—4,000 ohms, 5w.
T1—4.5-Mc IF—FM sound take off (Stanwyck #S-969)
T2—Primary: 30 turns #24. Secondary: 20 turns #24. on XR-50 (see text)
RY1, RY2—Advance d.p.d.t. 6-volt a-c relay; d-c resistance, 4 ohms
M1—Triplett model 227T, 0-10 ma., d.c.
SW1—push-to-talk switch on microphone,
SW2—push-to-talk switch on panel, s.p.s.t. toggle
SW3—potentiometer switch, on R16
SW4—2-pole, 4-position rotary switch, non-shorting Mallory #3223J
SW5—s.p.s.t. toggle
Xtal "A"—channel 343
Y1—1N34 xtal


V1A ½ 12AT7
V1B ½ 12AT7
V2 6BE6
V3 6BE6
V4A ½ 12AU7
V4B ½ 12AU7
V5 6AG7
V6 6146
V7 OB2
V8 OB2
CHANNEL 343 476 KC XTAL "A"
XTAL 3.5 MC
CRYSTAL FILTER (SEE FIG. 3)
T1
T2
L1 2.5mh RFC
L2
L3
L4
L5
Y1 1N34
M1 0-10 MA
SW4
METER POSITION
1 FIL VOLTAGE
2 PLATE VOLTAGE
3 PLATE CURRENT (FINAL)
TRANS.
RCVR. ANT.
RY 2
RY1
R39 4Ω 2W
R15 4Ω 2W
SW3 (ON R16)
PE-103 CONTROL CKT
-45V BIAS
+500
POWER SOCKET
6 VOLTS
SW5 FILAMENTS
SW2 PUSH TO TALK (ON PANEL)
TO BC RCVR B+ 250V
SOCKET
PLUG
PUSH TO TALK
SW1
CARBON MIKE
+250V
+300V
R1 650Ω
C1 .5μfd
R2 220K
C3 .1μfd
C2 .01μfd
R6 100K
C9 .1μfd
R7 470Ω
R8 22K
C10 .01μfd
C11 .01μfd
R9 22K
R10 1K
C12 .01μfd
R3 50K
C4 100μμfd
C5 .01μfd
C7 100μμfd
SEE TEXT
C6 10μμfd
C8 .01μfd
R4 10K
R5 100K
C13 .01μfd
R11 100K
R12 1K
R13 25K
R14 5K
C14 .01μfd
R17 200K
C20 .01μfd
R18 470Ω
C38 10μμfd
R19 22K
R20 22K
C21 .01μfd
C22 .01μfd
R21 1K
R22 100K
C16 100μμfd
R23 10K
C17 100μμf
C18 .01μfd
C19 10μμfd
R24 10K
R25 56Ω
C23 .01μfd
R26 150Ω
C24 .01μfd
R28 22K
C29 .01μfd
R33 2500Ω 5W
R32 1700Ω 25W
R27 56Ω
C25 200μμfd
C26 .01μfd
R29 1K
R31 100K
R30 1000Ω
C28 .01μfd
C15 50μμfd
R16 100K
R34 4.7K
R35 56Ω
C30 .01μfd
C32 .01μfd
C31 .01μfd
C27 .01μfd
R36 165Ω
C33 .01μfd
C34 .5μfd
R38 4000Ω 5W
R37 47Ω
C35 140μμfd
C36 .01μfd
C37 1500μμfd

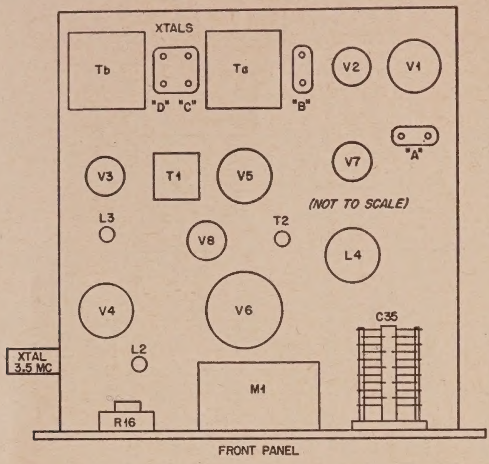


Fig. 4. Plan view of chassis top identifying the components shown in the photograph on the facing page.

very high value on peaks of plate current causing serious distortion of the output signal and spurious radiations. No resistance can be used in the grid circuit, because grid current would also cause the bias to increase again, causing distortion. It is unfortunate that a battery has to be used, but there is no other easier solution. The battery in the actual installation was taped up under the dash, and, for all purposes, forgotten.

The 6146 screen voltage is regulated by the two miniature voltage regulator tubes, *V7* and *V8*. This is necessary because the screen current increases with application of the voice input, and, with the usual series dropping resistor arrangement, the screen voltage would drop to a low value. This drop would decrease the gain of the stage and cause non-linear operation of the amplifier, producing intermodulation distortion products in the output. That is the stuff that sounds like splatter, and that occurs not only in the sideband you are transmitting, but also in the region of the suppressed sideband. It doesn't do much good to suppress a sideband carrying intelligence, and then replace it with meaningless distortion products. Keep it linear!

The usual precautions against v-h-f parasitic oscillations were taken by using resistors in both the grid and plate circuits. The 1500 μμfd. mica condenser across the output link winding is necessary to tune out the reactance of the link so that a flat coaxial transmission line will take the load properly.

The cathode metering resistor, *R36*, is home-brewed as follows: Wind about a dozen turns of number 30 wire on a one-watt resistor and shunt the 10 ma. meter with it. Connect this combination in series with a 100 or 200 ma. full-scale meter and a 200-ohm, 10-watt resistor across a 200- to 300-volt power supply. Careful now! The object is to shunt the 10 ma. meter to read 200 ma. full scale. A process of cut-and-try will reveal the correct amount of #30 wire to use as shunt resistance. The value indicated (0.165 ohms) was for the particular meter used.

Special Features

The major functions of the transmitter have been covered and only a couple of special features need explanation. The carrier reinsertion for the transmitter is accomplished by *V4A*. This feature is useful during tuning-up periods, and for working stations who are unable to copy SSB signals with the carrier suppressed. *V4A* is connected as a cathode follower and takes a small amount of the low-frequency crystal oscillator r.f. and shunts it around the filter to the second mixer signal grid. The potentiometer, *R13*, allows a variable amount of the carrier to be inserted. The reason for using a cathode follower is to provide isolation and prevent any coupling back into the low frequency oscillator stage.

The receiver carrier reinsertion arrangement mentioned earlier functions as follows: A very small amount of the low-frequency oscillator signal is obtained through *C6* and *R4* to insure that no loading of the crystal oscillator will take place. Likewise the 3.5-megacycle signal is obtained through *C19* and *R24*. The two signals are mixed in the crystal diode, *Y1*, a type 1N34. You will note that the low-frequency signal is transferred from the 1N34 circuit to ground during transmitting conditions by relay *Ry1*. This is to prevent any coupling back into the earlier stages of the transmitter. Grounding the circuit at this point does not load the 476 kc. oscillator because of the small size of the coupling condenser, *C6*, (10 μμfd.) and the large size of *R4* (10,000 ohms). Relay *Ry1* also transfers the B+ leads of the two crystal oscillators from the normal transmitter supply (when transmitting) to the car's broadcast receiver supply (when receiving). *Sw3* on the back of the receiver carrier insertion pot, *R16*, cuts this B+ line to the BC set when not receiving SSB signals The total additional drain on the BC set is only 10 milliamperes. Choke *L1* provides a d.c. return path for the crystal circuit.

Potentiometer *R16* is used to adjust the ampli tude of the carrier fed into the front end of th 75-meter converter. This permits adjustment fo optimum output, which is dependent upon th strength of the incoming SSB signal and th adjacent channel interference. It has been foun that when heavy QRM is encountered, injectin a very strong carrier into the receiver prevente the interfering carriers from producing the "cap ture effect" of the second detector. This also reduce the amount of audio recovered from the SSB signa but there is usually plenty of reserve audio gai available to take care of this.

Filter Alignment

While it is recommended that the alignmen procedure outlined in the original Edmunds article[1] or in the ARRL Handbook be followed, a few words of advice might be appropriate. The alignment is a compromise procedure. That is, the optimum shape for the bandpass is not that which results when maximum sideband suppression is obtained. This is unfortunate, but a workable solution can be found without sacrificing sideband suppression. The points to be kept in mind are these:

1. The filter itself is a low-pass filter, that is, it passes all frequencies (within a limited range) below the 476 kc. carrier frequency.
2. The rise from the carrier null to the pass band of the filter should be as steep as possible.
3. The filter attenuation should be at maximum at the carrier frequency.
4. The response of the pass band, 500 cycles lower than the carrier, should be within 3 db. (70%) of the peak in the filter response.
5. The peak in the response should be in the vicinity of 1000 to 1300 cycles below the carrier frequency.
6. Considering the suppressed upper sideband—there should be no rise (or bump) on the high side greater than 1/10 of the peak amplitude in the lower sideband. This ratio of 1 to 10 is a suppression of 20 db. More than 20 db. is desirable, if possible.
7. The upper sideband response will start to rise about five kilocycles higher than the carrier frequency. This is OK if you are certain that there is no audio being fed into the unit that is above 4000 or 5000 cycles in frequency. With the usual telephone type carbon microphone, there is very little output above 3000 cycles.

The choice of crystals for the lower sideband generation is as outlined in Edmund's article. Using the three-digit channel numbered FT-241 crystals, two crystals are needed for the carrier frequency, channel 343; one crystal in the channel just below, channel 342; and one crystal two channels above the carrier frequency, making it channel 345. Other channel numbers may be used if the same relative position relationship is maintained.

A common trouble in alignment is that the carrier null of the filter will not match the oscillating frequency of its companion carrier-generation crystal. If a selection of crystals is available, careful checking will probably turn up the right one.

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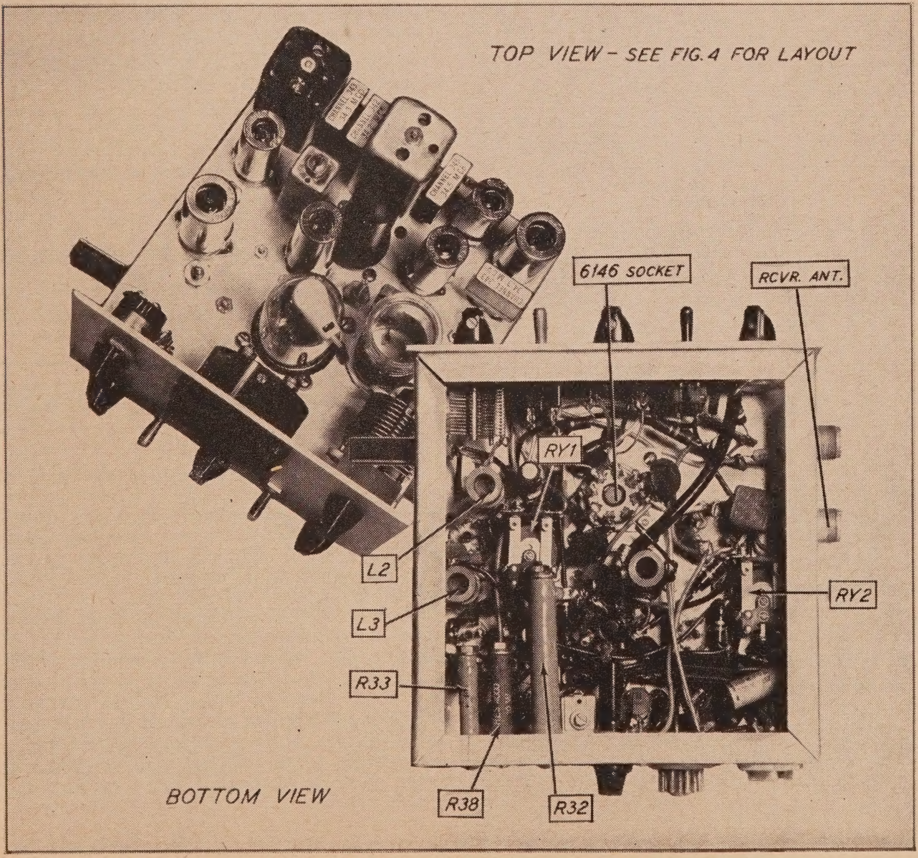
[1] Edmunds, "A Crystal-Filter SSB Exciter," QST, Nov., 1950, page 11.



If this is not the case, however, it might be possible to grind the oscillator crystal into the notch frequency. If the oscillator crystal is lower in frequency than the notch, grinding may be accomplished as follows: Carefully remove the crystal cover, and hold the plated crystal (tiny, isn't it!) with the XYL's tweezers and carefully rub the exposed *edge* with a carborundum stone one or two light swipes at a time. Plug it back into the oscillator socket and check its frequency against that of the notch, and proceed accordingly. This sounds more painful than it actually is.

Tune Up

The tuning procedure is quite conventional, and, with the aid of the transmitter carrier reinsertion control, is easily accomplished. With plate voltage applied, and no carrier nor audio input, the final plate current should idle at about 35 milliamperes. Advance the carrier insertion control to "full on," and, using an insulated screwdriver, adjust the trimmers or slugs in the 4.5-Mc, f-m sound transformer, *T1,* for some indications of increase in the 6146 plate current. A receiver may be required to make the initial adjustments, as all of the circuits may be too far off resonance to permit any drive to reach the 6146 grid. At any rate, tune for maximum 6146 plate current swing in all circuits except the 6146 plate tank, which should be dipped in the usual manner. Caution should be used so as not to injure the final tube by running it too long in a detuned condition with an excessive plate dissipation. Antenna loading should be fairly heavy. A loud whistle in the microphone should drive the loaded 6146 plate current up to approximately 150 milliamperes. Don't hold that pucker too long!

Operation

When the great moment arrives, don't get "buck fever"—don't shout too loudly into the microphone. The final plate current should kick up to about 75 to 90 milliamperes with average voice inputs. Any more than this and you can be sure that the peaks are being limited somewhere in the amplifiers and you can also be sure that the signal is sounding rough. Take it easy! Those SSB boys have receivers that are really out of this world. They will hear you reaching for the switch!

Tuning in SSB signals takes a little practice, and not a little patience. If you keep in mind what you are trying to do, the job will be much easier. Slowly tune the receiver until a SSB signal is heard within the operating frequency range of the transmitter. Turn on the receiver carrier reinsertion and advance the amplitude pot to a moderate level. Now swing the frequency control knob on the transmitter panel until the SSB signal makes sense. When this is accomplished you have supplied carrier at the correct frequency. Now check the mobile converter to see that it is tuned slightly lower in frequency than the supplied carrier for lower sideband reception, and tuned slightly higher than the supplied carrier for upper sideband reception. The correct position is indicated by recovering the maximum audio from the SSB signal. Last, adjust the carrier amplitude for best results. As already mentioned, the best level for the carrier depends on the SSB signal strength and the level of adjacent channel QRM.

If you want to supply carrier in the transmitter, the following should be observed. The transmitter carrier insertion control should be advanced until the final plate current reads 60 to 70 milliamperes Speech input should cause this current to just *barely* kick on peaks. If more than this is used, the signal as received on a conventional AM receiver will sound slightly distorted. This is because there is too much sideband signal for the carrier transmitted. Please note that "over-modulating" the carrier in a SSB transmitter will not produce splatter outside the normal spectrum occupied by the signal. For a detailed explanation of this see Grammer[2].

The authors' experience in operating this unit have been very gratifying. The unit described was the third one built. The first used a pair of de-based 807W's, the second an 829, and the last the 6146. The 6146 appeared to be the most suitable tube for the conditions set up. During the evening hours it is possible to work stations 1000 to 1500 miles away without any difficulty. The theoretical 12 db. gain of SSB over regular double sideband AM transmission really shows up. Comparisons of the AM and SSB transmitters have been made with the expected results. The SSB signal literally jumps right out of the noise and QRM, while the AM signal is plagued with the ever-present heterodynes and racket.

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[2] Grammer, "D.S.R.C. Radiotelephony," QST, May, 1951.

Inside the Shack and Workshop

"Look Ma—No Hands!"

It is generally considered a good idea when running around mobile to try and keep both hands on the steering wheel. I have found that the easiest way to do this is to use a headlight dimming switch to put the transmitter "off" and "on."

Simply install the switch on the floor of the automobile a few inches forward and to the left of the clutch pedal. Most of these switches require a ¾-inch hole. Since the switch is "positive" in action there is no chance of fatigue such as you get when holding a mike switch closed. It is out of the way and should not interfere with routine driving.

The wiring of the dimmer into the circuit is left to the operator, although I will mention that most of these switches are rated at about 30 amperes.

Dan Wern, Jr., W2YDH

Go Mobile on 160

DAVID TRANBERG, W0RRJ

Hallock, Minn.

Many amateurs have discounted the possibility of successful 160-meter mobile operation, because of the theoretically low radiation efficiency of a practical antenna. W0RRJ's experiences prove, however, that a low-power, 160-meter mobile transmitter will "get out."—Editor.

After discovering that operating 28-Mc mobile for only a few hours on Sunday afternoon resulted in my missing practically all band openings, I decided to switch to 160 meters. To do so, I dismantled my *Motorola-FMT-30D transmitter,* except for the power and control circuits, and rebuilt the r-f and audio sections to run about twenty watts on AM phone.

Several 160-meter circuits described in various amateur publications have been used, all working about the same. For the record, the present lineup uses a 6AG7 crystal oscillator, 6V6 buffer and a 6146, pi-tuned output stage, modulated by a 1635, driven by a 12AT7. This arrangement is just a little weak on modulation; therefore some modification of the audio end is contemplated, but this is not part of the story.

The transmitter and an extra storage battery are installed in the trunk of my 1950 Plymouth. An eight-conductor cable joins the transmitter to the control panel mounted under the dashboard. The only thing in this part of the installation that is the least bit unusual is a relay wired to permit choice of either of two crystals from the operating position.

The Antenna

The antenna is a standard, eight-foot mobile whip, mounted on the rear deck of the car, as seen in the photograph. Being eager to test the installation, I connected the antenna to the transmitter through a loading coil inside the trunk. The input was twelve watts.

I made a schedule with W0HNV, located twenty miles away in Drayton, North Dakota, and raised him on the first call. My report was *readability 5, strength 5.* I then started driving away from him. At a distance of thirty-five miles, my report was *readability 5, strength 3 to 4.* Two other stations, one fifty miles away, and the other sixty miles away, broke in to report that they were also copying me.

Encouraged by these results, I designed and built the loading coil seen in the picture. First, I obtained a wooden rolling pin, 2¼ inches in diameter and eight inches long. I then took two steel washers, two inches in diameter, and drilled four small holes in each. Next, I welded a ⅜-inch stud to each washer and fastened one to each end of the form with wood screws. Finally, I put the winding on the form.

The coil is close wound with No. 18, cotton-enamel insulated wire. In my installation, 146 turns are required to resonate the antenna to the low-frequency edge of the band. I would recommend winding on more than enough turns to start with, because it is easier to remove turns than add them. The ends of the winding terminate in a soldering lug under one of the screws, fastening the end fittings to the form. When the main winding was completed, I wound a single turn of wire around it near the bottom and connected it to a No. 47

(Continued on page 107)

This photograph shows the home-built loading coil that is used with an eight foot whip on 160 meters. The coil is 2¼ inches in diameter and 8 inches long. It is wound with approximately 145 turns of No. 18 wire.

Care and Feeding of the Storage Battery

J. H. GOFFE, W2BGF

RD #3, Sewell, N.J.

In the 1952 SPECIAL MOBILE ISSUE the author discussed ignition problems and interference; this year W2BGF has chosen a subject that will also be of tremendous interest to the mobile operator—the car battery. Regardless of whether your installation is old or new, a careful study of the following text may solve many problems and give you months of trouble-free motoring.—Editor.

The proper care and feeding of the automobile battery is a subject of great mystery to most American car owners. Consequently, it is a matter left to the whims and fancies of the corner service stations around the nation. This article is dedicated to the multitude of motorists whose starter responded with a slight grunt instead of the customary whirr on a cold morning this past winter. To them, hit-or-miss battery service has been found somewhat deficient, to say the least.

Aside from economic considerations, and the emergency need of your car, the convenience factor alone should prompt every car owner, especially the mobile operator, to consider the proper care and feeding of the automobile battery as an essential item in vehicle maintenance.

The proper care of your automotive storage battery *is* simple, and, ideally, consists only of watering, cleaning and charging. If all equipment is operating satisfactorily, charging is automatic, watering is required very infrequently and cleaning is needed but once or twice a year. And were it not for the "if" above, this article could close at this point. Since the "if" does exist, however, we perforce continue.

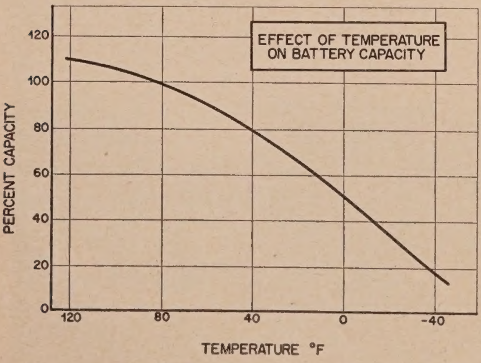

Fig. 1. The number of battery failures increase during cold weather due to the effect of temperature on the chemical reaction.

How The Battery Works

The automotive type storage battery operation is a chemical reaction involving lead, lead oxide and sulfuric acid. During discharge the above components recombine to form lead sulfate and water. The water formed dilutes the sulfuric acid electrolyte, thus reducing the specific gravity of the cell. On charging the chemical reaction is reversed. When overcharged beyond the point necessary to complete the chemical reaction, the water content of the electrolyte is reduced by electrolytic decomposition. Hydrogen is liberated at the cathode while oxygen is liberated at the anode; both of these gases bubble from the liquid and are lost, thereby requiring the water additions.

The capacity of a battery to store electrical energy is controlled by the quantity of ingredients available for chemical reaction—i.e., the size and number of plates. The ability of the battery to deliver high rates of current flow is limited by its internal resistance—i.e., plate area. Thus it can be seen that the larger physical-sized units store more energy and can deliver it at higher rates than smaller units.

It must be borne in mind, however, that even a large size automotive type battery stores a surprisingly small amount of energy. For example, a fully charged De Luxe battery of 120 ampere-hour rating would operate the modern car with its high electrical load only about 1 to 2 hours before becoming exhausted. This dramatically illustrates the fact that, in your car electrical system, the battery really plays a relatively unimportant part since without charging equipment its life would be woefully inadequate.

The greatest portion of battery failures occur during cold weather. The reason for this can be readily seen by referring to *Fig. 1.* This curve shows the effect of temperature on battery capacity.

The first 20°F day of fall reduces the capacity of your battery to approximately 2/3 of normal. Further, if your battery was only half charged to begin with, this capacity falls to only about 20% of normal! This further reduction can be seen from the curves of *Fig. 2.* The obvious moral of this story is—keep your battery fully charged at all times.

In addition to the ability of the battery to crank your car at any given moment, the correct state of charge has an important influence on the life of your battery as illustrated in *Fig. 3.* Here it can be seen that either too high a regulator setting causing over charge or too low a regulator setting causing undercharge or sulfation, reduced battery life about 50%.

Recently, a major battery manufacturer made a survey of junked car batteries to determine the causes of failure. The results of this survey are given in *Table I.*

Table I

Still Serviceable	13%	Cracked Separators	3%
Overcharged	55%	Container Failures	10%
Sulfated	18%	Manufacture Faults	1%

Examination of this table reveals the following rather startling facts: that 68% of the batteries checked or 78% of the defective units failed as a result of malfunction of the *other* components of the car electrical system; a cause that could have been readily avoided by adequate maintenance. Your part in this effort is to keep the battery water level as called for by the manufacturer, keep the battery clean and properly fastened in its carrier, and finally, keep the charging equipment in proper adjustment.

As previously pointed out, the proper care and feeding of the automobile battery really requires the proper adjustment and maintenance of the charging equipment. The radio amateur is in an excellent position to do just exactly that, so let us discuss the operational characteristics of those other components to illustrate the proper care of such equipment.

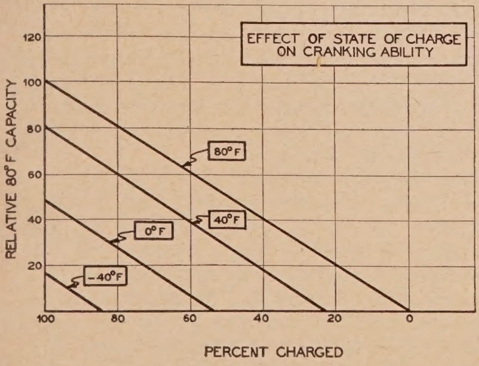

Fig. 2 Quite often the first cold day strikes when you least expect it. If the battery is only partially charged to begin with you may end up with scarcely enough capacity to light the filaments—let alone start the engine.

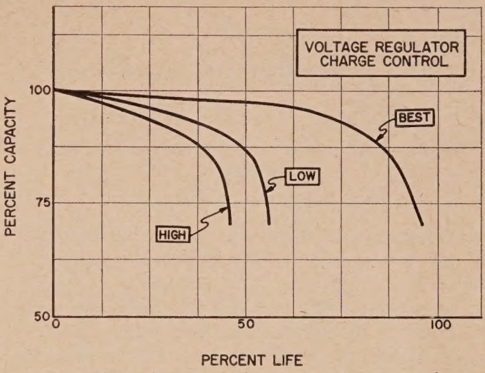

Fig. 3. The voltage regulator must be correctly adjusted for maximum battery life. Setting it too high or too low may cut the life in half.

How The Generator Works

As the source of charging energy is the generator, let us first examine this component of the electrical system. While the precise connections of generators in the various makes and models of cars vary one from the other, the following explanations will be fundamentally true. Modify the discussion to fit the particular circuitry of your vehicle.

As amateurs we are all familiar with the fundamental concept of electromagnetic induction wherein current flow in a conductor is induced by the influence of a moving magnetic field. The automobile generator is a practical machine based on this basic principle. In this case, the conductor is the wire placed in a slot in the armature or rotor of the generator. The magnetic field is created by the field coils and poles. Motion is introduced by the rotation of the armature. Thus, the conductor is moved with respect to the stationary magnetic field.

A little thought will show that a single conductor moving in a circular path moves past one field pole, then the other, but in the opposite direction. As a result of this apparent reversal of direction, the induced current in that conductor also reverses. Since we want direct current to charge the battery, the reversible current in the conductor, an alternating current, if you will, must be rectified to d.c. In the automobile generator this rectification is accomplished by the commutator. Here collector brushes are located in such a position as to connect each conductor in turn, one after the other, to the external circuit at just the right time to rectify the a.c. actually generated, to produce a d.c. output.

The output voltages and currents are controlled by the mechanical and electrical design of the generator, the speed of rotation and the strength of the magnetic field. For the generator installed in your car, the controllable factors are the speed of rotation, and the strength of the magnetic field. Generators are either gear or belt driven by the

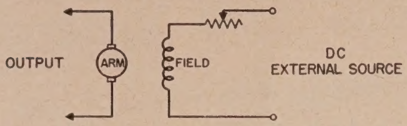

Fig. 4. Schematic of a separately-excited shunt generator.

car engine so that their speed is directly controlled by the car speed; no other control of speed is required.

The magnetic field in which the conductors rotate is produced by special soft iron poles placed on opposite sides of the armature so that the flux they create goes through the armature. Each pole is wound with field coils so that they become electromagnets, their magnetic strength being controlled by the amount of current flowing through the coils. This current, known as field current, becomes the main method by which the generator output may be properly regulated.

Field current in any generator is usually obtained from either of two sources, a separate source of supply such as a battery or other generator, or from the generator itself. In the first case the generator is known as a separately-excited generator, while in the second case it is known as a self-excited generator. *Figure 4* shows one circuit diagram for a separately-excited generator and *Fig. 5,* the self-excited generator.

As previously noted, the output of a generator may be controlled by field current. *Figure 6* shows the type of performance to be expected of a self-excited generator for low and high values of field current. From this curve it can be seen that a much larger value of output current would result from a high field current. The absolute maximum capacity of a generator is limited by its design and the maximum strength of magnetic field that can be obtained. In practice, the maximum output is limited by the safe temperature at which the unit can be operated, since high output means high armature and field currents, hence high I^2R heat losses.

Just one more point on generators. Since the generator supplies its own field current, it is obvious that with no output there is no field current, and with no field current there is no apparent output! This poses the problem of starting the generator to operate in the first place. The incongruity here posed has been resolved by the designers of the generator by the simple expedient of the use of proper materials. The metal selected for use in the field pole pieces is of such a nature as to retain a slight amount of magnetism even though the field current has fallen to zero, that is to say, they are permanently slightly magnetic. Thus, there *is* some output even for zero field current, therefore producing a condition wherein the generator will "build-up" to normal output levels without special attention.

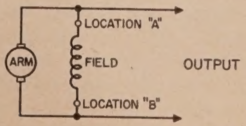

Fig. 5. Wiring schematic of a self-excited shunt generator.

The Regulators

We have now reduced the major problem of the care and feeding of the automobile battery to the proper control of generator field current. This responsibility is assigned to the generator regulator. It is in this phase of the automobile electrical system that the greatest difference in connection methods appear. No essential difference exists between systems using the positive battery post as ground and those using the negative battery post as ground. In bygone days, generators were connected in a "three-brush" system and required a "two-unit" regulator. Since few, if any of these old systems now appear on passenger cars, they will not be discussed in this article. Modern cars use a "two-brush" generator as shown in *Fig. 5,* and a "three-unit" regulator. Although different vehicle manufacturers may locate the field regulation controls at either "A" or "B" of *Fig. 5,* both systems operate in the same manner. The following discussion and diagrams will assume a control location, such as location "B" of *Fig. 5.*

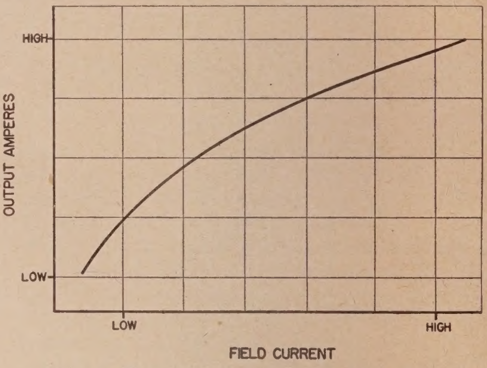

Fig. 6. The output of a self-excited shunt generator is directly proportional to the field current. The maximum output is limited by the design of the generator.

The three-unit regulator usually consists of a cutout relay, a current regulator, and a voltage regulator. A typical wiring diagram for such regulators is shown in *Fig. 7.* Inasmuch as a d-c generator will operate either as a generator or as a motor, it is necessary that the generator be disconnected from the battery at low or zero engine speeds else it takes power from the battery in its effort to run as a motor.

It is the purpose of the cutout relay in the regulator to accomplish this disconnection. As can be seen in the diagram of *Fig. 7,* the generator-battery current passes through the contact of this relay as well as through one of its two energizing coils. The second coil of the cutout relay is a voltage coil, being connected across the generator output.

The cutout relay operates in the following manner. When the generator output voltage is low, the relay magnet strength cannot overcome the spring pull so the relay contact remains open, thus disconnecting the generator armature from the battery. As the engine speed increases the voltage increases, thereby increasing the cutout relay magnet strength until it overcomes the pull of the spring. At this voltage level—somewhat greater than battery voltage—the relay closes, connecting generator across battery, and since the generator voltage is the higher, charging begins. The charging current flows through the current coil of the cutout relay, further increasing the closing pull, and securely closing the contacts.

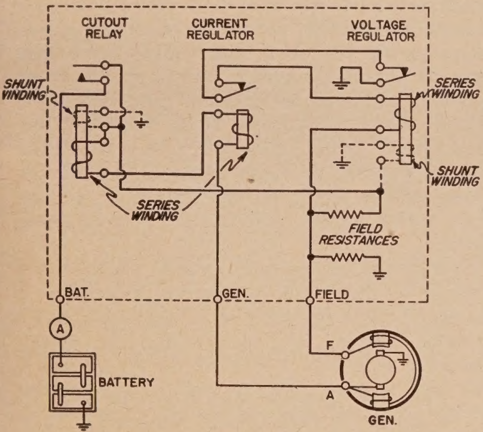

Fig. 7. Typical wiring schematic of regulators in an automotive system.

As engine speed falls off, charging voltage and current falls until generator voltage is less than battery voltage. The generator now endeavors to operate as a motor drawing current from the battery. Since this current is opposite to the charging current, the flux it creates in the current coil of the cutout relay now opposes rather than aids that of the voltage coil, so the relay opens, disconnecting the generator. This sequence of events follows for each and every change in engine speed to or from the idle speed zone.

Proper adjustment of the cutout relay may be made by measuring the voltage between the "GEN" terminal of the regulator and ground with engine idling. This voltage will be anywhere from zero to about 5 volts. *Slowly* increase engine speed noting voltage at which cutout relay closes. This should be in the range of 6 to 6.5 volts. Adjust spring tension if necessary to obtain this reading. Increasing spring tension raises the reading, decreased tension lowers it. If no meter is at hand, use the ammeter on car dashboard. On slowly increasing speeds, needle should jump from slight discharge to slight charge. On slowly decreasing speeds, ammeter needle should drop slowly to mild discharge, then jump towards zero, resting at slight discharge. Too severe a discharge suggests increasing spring tension, none—reducing spring tension.

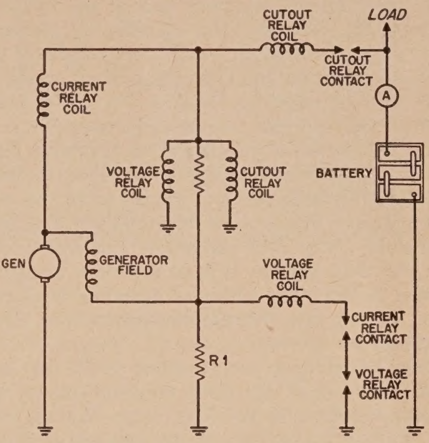

Fig. 8. Simplified wiring schematic of Fig. 7.

For the purpose of analysis of the current regulator and voltage regulator relays, the electrical system diagram has been redrawn and is shown in *Fig. 8.*

The sole purpose of the current regulator is to protect the generator from excessive load and consequent burnout. As can be seen in *Figs. 7 and 8,* the current regulator relay coil carries the full generator output, hence the action of this relay is controlled by means of generator current. Proper setting of this relay, usually the center of the three relays and wound with heavy wire, can be done by inserting an ammeter between the "GEN" terminal of the regulator and the generator "A" terminal. Adjust spring tension to cause the relay to open at the rated current output (see nameplate) of the generator. Again increasing spring tension raises reading. If no ammeter is available, use car dashboard ammeter. Since these are not precision meters, it might be safest to limit current to about three-quarters of full scale.

As to the action of the system upon closing of this current relay, its contact opens, thus opening the low resistance circuit of the field to ground through the voltage relay coil. This in effect, places *R1* in the field circuit, thus reducing field current to a safer limit. The drop in field current then reduces the magnetic pull of the relay core, the spring now rules, so the relay closes, again connecting the field directly to ground and returning the generator to maximum output. Once again the cutout relay opens due to excessive current so the entire cycle continuously repeats.

Thus it can be seen that the current regulator relay operates in a vibratory fashion and in effect controls the average value of charging current. *Figure 9* is a cathode ray oscilloscope pattern of the field current of an automotive generator operating under current regulator limiting. The lower horizontal lines represent zero volts between the generator field terminal and ground, or, maximum field and output current. The upper lines show the voltage level between field and ground when the current regulator contacts are open, that is, the drop across the series field resistance. For this condition the field voltage is less, therefore armature current is less. The vibratory operation is clearly seen. In this case the vibration period was about 40 cycles per second.

Now let us turn our attention to the last but most important of the three regulator relays, the voltage regulator relay. This relay, like the cutout relay, is frequently a double-coil relay. When a single coil, it is connected from output to ground, sensing system voltage. In the double-coil relay one of the coils is voltage while the second is sensitive to field current. Thus, when operating on current control, the voltage regulator is inoperative. This points out a very important fact—that when properly adjusted, the car regulator operates on either current or voltage regulation—always one or the other (except for low speeds), but never both at once.

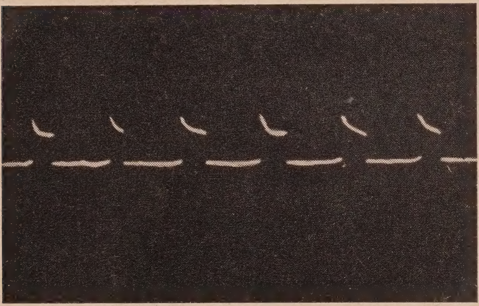

Fig. 9. Oscilloscope pattern of the field current of the generator with current regulator limiting. The vibratory operation can be seen quite clearly. In this instance it was at about 40 cycles per second.

Voltage Regulator Settings

Since this relay is voltage actuated it senses the overall system voltage. As the state of charge of the battery likewise effects system voltage, this relay controls battery state of charge. As was pointed out earlier in this article and shown in *Fig. 3,* the setting of this relay is of paramount importance in battery operation and life.

In operation this relay, like the current regulator relay, opens at a particular voltage, changing the field circuit as before. This drops output voltage, so relay opens. Once again a cyclic operation is established identical to that of the current regulator.

The setting of the voltage regulator relay is extremely important and should not be undertaken unless it is definitely known that a change is required. The need for correction will be indicated by excessive use of water, heavy corrosion of terminals, low gravity reading of the battery, either very low or very high charge rates most of the time, and/or peculiar ammeter behavior. Correct setting of the voltage regulator will be denoted by a gravity reading of 1.240 to 1.275 at all times and little use of water. Under ideal conditions the ammeter needle should move to full charge immediately after starting the car, remain there for perhaps five minutes, then fall to a slight charge for the balance of the trip.

If you are convinced that the relay requires change, the following procedure is recommended. Operate vehicle for several miles until the underhood temperatures are up to normal. Under no circumstances try to adjust any of the regulator relays unless this has been done. Most units have bi-metal hinges that act as temperature compensators so that operating temperatures for adjustment are a must. Proceed to set cutout and current regulator relays as per previous directions, if required. Using a voltmeter (0 to 10 volts) connected from "GEN" to ground, with current relay held in closed or de-energized position, slowly increase engine speed, reading maximum voltage. Reset spring tension to give a 7.2 volt maximum setting.

Operate the vehicle in its normal manner for a week or so, then check battery specific gravity. If the gravity is in the range of 1.240 to 1.275, and if ammeter behaves as just described for normal operation, your job is finished. If the gravity is still low, however, recheck voltage and increase setting about 0.2 volts by further adjustment of the spring tension. Driving car for another week, then recheck. Continue this procedure until proper results are obtained. Thereafter, any change in electrical system operation will be shown in a change in the behavior of the ammeter needle. It is recommended that the battery specific gravity be checked about every two months. The cost of hydrometer and time will be amply repaid in reliable performance of battery and car.

With your vehicle electrical system in this condition you need have no fears about adding the mobile gear load to the electrical system. Only in the very unusual case of a high percentage of operating hours should trouble be encountered with the extra load. The author's car battery has never been checked below 1.230 gravity even with fairly heavy mobile operation. In a radio equipped truck used for test purposes where the two-way radio is in heavy service eight hours per day, boost charges are required only every six weeks.

So there you have it. Keep your battery watered and clean; adjust your electrical system as described, and then watch the ammeter needle while the miles and miles of trouble-free service become yours without wondering if tomorrow morning you will be able to start the car—a worry-free boon to you, the XYL and the Jr. op (if he also has a stake in using the family chariot.)

W. M. SCHERER, W2AEF

Contributing Editor, CQ

the TNS

Twin Noise Squelcher

As W2AEF points out in his opening, every once in a while the fellows let a really "hot" circuit slip by them. The TNS is a very good example since it is undoubtedly the most effective noise silencing (not limiting) circuit developed.—Editor.

Certainly one of the greatest problems encountered in mobile reception is that of eliminating or suppressing ignition noise picked up by the antenna. Although excellent material has previously appeared on the subject of noise suppression, no mobile issue of a magazine would seem to be complete without some reference to effective noise suppression, or limiting, methods at the receiver.

Included in the data, already published, is a two-tube noise limiter which outperforms all others so far presented. Unfortunately, however, even though it was shown in *CQ* over one year ago,[1] in most areas it has not received the attention it so duly deserves. The writer, as did apparently many others, passed it up as just another noise limiter circuit.

Up to several months ago, we had been using a full wave series noise limiter,[2] since it was found to be superior to all the other series, shunt, and compound types thus far tried. Results in limiting noise pulses, while receiving a signal, were quite satisfactory, but during standby receiving periods, or when tuning around the band for signals, the residual background noise, produced by the clipped noise pulses, was just too uncomfortable to the ear over even moderate periods of time. This was not too bad on country roads or in quiet localities, but it was very annoying when driving on concrete highways where the concrete reinforcing steel grids carry ignition pulses for many miles.

It was brought to my attention that reference was made to a semi-squelching arrangement in the text describing the two-tube limiter, or the "Twin Noise Squelcher" as we now prefer to call it. The squelching idea appeared to have a good deal of merit, so it was decided to give it a whirl, even though we feared that strong ignition noise pulses would trigger off the squelching so that it would be impractical under these conditions. The circuit diagram, and explanation of operation, is shown in *Fig. 1* as it originally appeared in *CQ*.

Comparison Tests

Two limiters were made up on separate chassis; one, the full-wave series type with adjustable clipping level control, the other, the *Twin Noise Squelcher* (TNS) with the adjustable squelching control. *Jones* plugs and a cable were also installed, so each limiter could be plugged into the receiver, in order to make comparisons between the two.

The first check made was that of noise suppression during the reception of modulated signals. Here the full-wave series unit was inferior in that the ratio of audio-to-background noise was poorer than that of the TNS. In the full-wave device the noise pulses are clipped, as are the audio peaks when the level is set for useful clipping. This, in effect, brings the audio and noise peaks near the same level, and, at the same time, the clipping action introduces noticeable distortion of the audio wave. With the TNS, the audio peaks are practically unaffected, while holes are being punched in the signal by the noise impulses.

The squelch action was then applied by advancing the squelch control until all normal background

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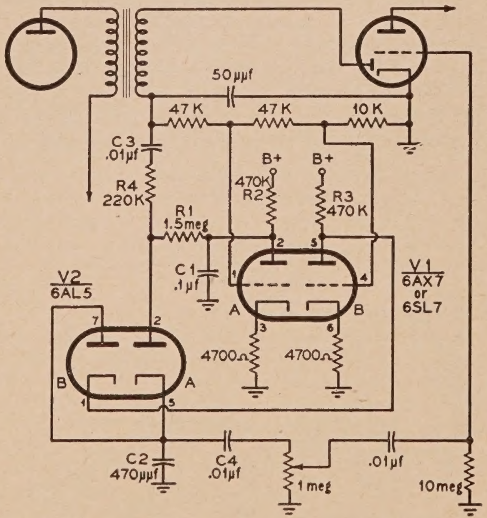

Fig. 1. The original schematic as it appeared in the January 1952 issue. See page 82 for modifications.

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[1] Mobile Corner, CQ January 1952, page 51.

[2] Grenfell, "A Noise Limiter For Everyone," CQ, July and August 1952.

Mobile Madness

C. TIERNEY

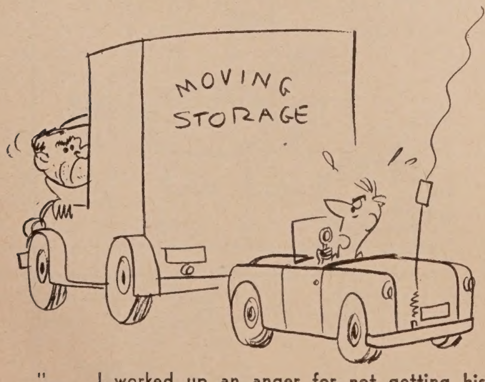
I started building a mobile rig because of neighborhood TVI, and after working on it for two months I finished the rig and installed it in the car. Eagerly I backed the car out of the drive, happily anticipating the roving contacts that were to come.

Two blocks from my house I called CQ on 75. When I stood by I heard someone complaining hotly about a Ham on the frequency who was splattering all the way down to the high end of the broadcast band. I listened for a few minutes hoping to hear the fellow, but he didn't come on. I called CQ again and got a station ten miles away. My first mobile DX!

The Ham said I splattered, broke up on highs and didn't have any lows. Personally, I think he had a bum receiver and wouldn't admit it. He said he couldn't read me so I QRT'd finally in disgust. It's a strain to work a station that hasn't proper receiving equipment. When I signed I heard the ham who had complained about the splattering station. He was bellowing about it again. I listened for a while but didn't hear the station. It must have come on only when I was on.

After a few blocks I called CQ again. A station twenty-five miles away answered. I was really getting out! When I came back to him my car was stalled with a big truck jamming the road in front of me.

To make conversation I began complaining about truck drivers in general, commenting bitterly on their fiendish delight at being all over the highway at once; I touched upon their boisterous horns and on their uncouth manners. Still stalled, and warming up to the subject, I attacked the personal characteristics of the driver in front of me, working up an anger at his stupidity for not getting his truck started and commenting on his ancestry.



". . . I worked up an anger for not getting his truck started and commented on his ancestry . . ."

Suddenly, and without warning, he was beside me. "Who's a stupid ape?" he asked. "I heard you on my truck radio. Nobody's going to broadcast to the world about me like that and get away with it. Get out of that car and put up your dukes!" He was a big fellow with a broken nose and a cauliflower ear. Not a nice guy to have BCI trouble with.

I looked around for some place to run but there was no place to go in the traffic jam. He opened my car's door and pulled me out, growling deep inside his chest.

The traffic jam was clearing when I picked myself up off the street and got back into my car, carefully feeling a tender eye. I tried to renew the QSO but the Ham wouldn't talk to me. He, too, was a truck driver.

The Ham who had been complaining about the splattering station was really crying about QRM (he had some of his wife's relatives in the shack and was showing them how amateur radio worked). I felt sorry for him and gave him a call. When he came back to me he said something like, "It's you . . . you . . . you . . .!" Then he bubbled and gasped and gurgled. Someone in the background tried to sooth him, and they turned off his rig. I wondered what his trouble was. Later I found out he was on the verge of a nervous breakdown because of some splattering mobile station.

I was beginning to sour on mobile. I certainly wasn't getting out like I thought I would. However, I gave it one more try and answered a CQ. This fellow was quite a distance away—about thirty miles—and he gave me a S2-3 report. "Drive around till you find a better spot to get out," he told me.

There was a hill in front of me and I drove up it to the top. I parked on a street at the top and gave the station a call. He came back giving me a S8 report. "But," he said, "I'm not properly equipped to receive single sideband signals like yours."

I was trying to explain to him that I wasn't using single sideband, but screen modulation in the conventional manner, when two cops drove up and one of the cops got out of the police car and came to me. "What do you mean by parking in the middle of the street?" he asked angrily, taking a little black book and a pencil from a pocket.

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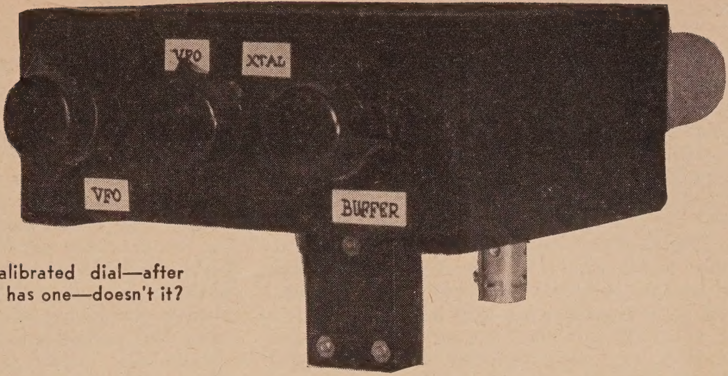


Fig. 1. Yes—it has no calibrated dial—after all, your converter/receiver has one—doesn't it?

A Díal-less VFO

RICHARD GRAHAM, W1VJV

7 New Street, Danbury, Conn.

Well, maybe this v.f.o. isn't entirely dial-less, but you will admit that the idea is practical for the mobileer. In other words—why didn't I think of it?—Editor.

The use of low power in mobile rigs makes -f-o control almost mandatory when operating in crowded band. The ability to jump around the and and avoid being squashed, communication-ise, by the higher power fixed stations makes a f.o. in the mobile rig very attractive indeed! hose brave souls who dare to work fixed fre-uency crystal controlled 80-meter mobile in the vening, know of what we speak.

The design and installation of a mobile v.f.o. resents many different problems because of the ry nature and conditions under which it will be ed. And we might add that all of these problems e not electronic either! Perhaps number one oblem is the car-sharing XYL who objects to ing the family grocery shopping with a car hose interior is rapidly approaching the com-exity of jet aircraft. This, of course, was my own YL's opinion. Thus the addition of a v.f.o., if we ere to have one at all, had to be simple, compact d completely unobstrusive. Actually, this was und reasoning, and we were reluctantly forced agree that perhaps the XYL was right.

Solving a Difficult Problem

The electronic problems associated with stability, bration, mild shock and the like were solved in conventional way; simply, with rugged construc-n. However the first requirement of compact-ss and unobtrusiveness was met in a rather vel way——guaranteed to pacify and eliminate e objections of even the most critical XYL.

By now, you've probably looked at *Fig. 1,* which ows the front of the v.f.o. and are exclaiming horror at the fact that there isn't any frequency calibration on the dial, or for that matter anywhere on the v-f-o unit. But this is as it should be. This "dial-less" v.f.o. works on a principle a little different from the usual. The accuracy of this method is at least as good as most present-day mobile units.

Elimination of the calibrated dial has a number of merits, particularly for mobile work. Since there is no calibrated dial, the panel need only be large enough to hold the components behind the knobs. Any kind of mechanical bandspreading dial takes space, and if it is to be read accurately, the panel will correspondingly have to be big. This, of course, is contrary to our initial requirement of compactness and unobtrusiveness.

Actually, why do we need a calibrated dial on the v.f.o. if we already have a calibrated converter in the car? With a little switching and electronic conniving, the calibrated converter dial can be made to perform both functions. The only missing link is a method of ascertaining that the converter dial reading is accurate. The answer to this is a frequency standard, in the form of a crystal oscillator, that can be used to calibrate and set up the dial of the converter. Such an oscillator can easily be built into the v.f.o., and it should give us all the assurance we need.

Thus, in operation, after both the receiving system and v.f.o have been warmed up, the middle switch on the v.f.o. marked *VFO-XTAL* is thrown into the *XTAL* position. This places a crystal oscillator of some known frequency into operation. The converter dial is set to this known frequency and the auto receiver dial is adjusted to peak up this signal. The converter has then been calibrated. This procedure need only be followed occasionally, according to the drift characteristics of your converter and auto receiver.

All that is necessary to place the v.f.o. on any particular frequency, is to set the converter on this frequency——then adjust the v.f.o. to produce a signal in the receiver. That's all there is to it. It takes more time to describe the operation in words than to actually perform it.

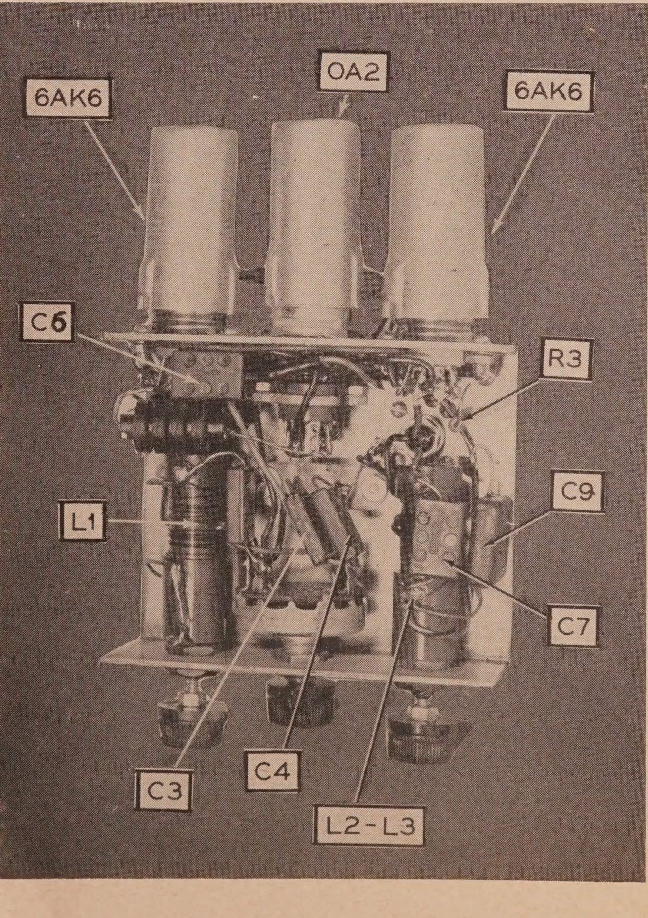
Compactness is further achieved through the novel use of *National XR-50* slug-tuned coil forms for the oscillator frequency control and for the buffer tuning control. These coil forms eliminate the need for bulky air capacitors for tuning. Small fixed mica capacitors are used instead. Because of the powdered iron core, greater inductance is attained in less space, achieving even greater compactness. Furthermore, the use of these forms provide a simple method of obtaining mechanical bandspread. It takes some seven turns of the *v.f.o.* knob to cover 3.5 to 4 Mc. This can be compared to the one-half turn of a variable condenser (if one were used for tuning). Finally, the tuning lead screw is spring loaded. This gives the assembly the mechanical rigidity so necessary in oscillator construction. You can be sure that, once the dial is set in one position, it won't shake off to another frequency.

Two very minor modifications are necessary in order to adapt the coil forms for use in this type of service. One is to adapt the 6-32 threaded shaft that extends from the coil form to take a ¼-inch knob. This is easily done by using a 6-32 threaded spacer with a ¼-inch outside diameter. A lock nut is first screwed on the shaft, followed by the threaded spacer. This nut is then tightened up against the spacer to lock it in place so it will not rotate. The second modification is that of freeing up the operation of the screw shaft. As stated before, the screw is spring loaded with a small *U*-shaped piece of spring wire which presses tightly against the threads of the screw shaft. In many cases, this presses a little too tightly, causing excessive wear on the threads. The remedy is to dis-assemble the coil form by removing the large nut and dropping the slug, shaft, etc. out of the coil form. The spring can then be removed and bent open slightly to provide a firm but smooth screw action. A drop of oil on the 6-32 shaft completes the modification.

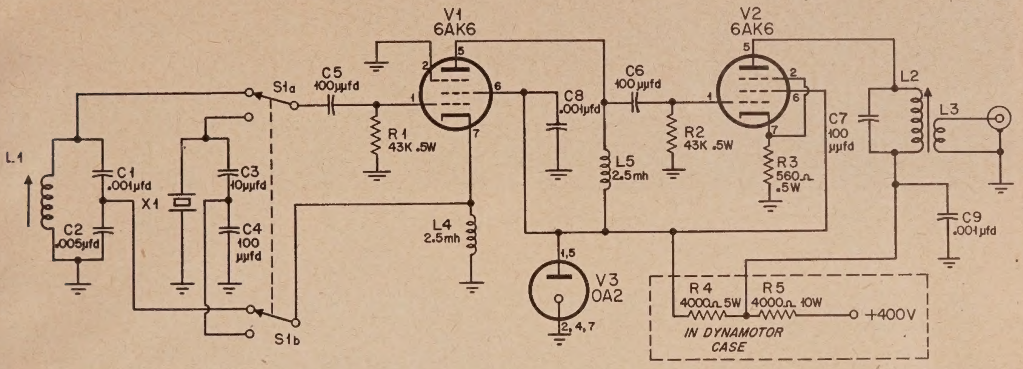
The Circuit

Circuit-wise the unit is quite straightforward. The oscillator consists of an electron coupled Colpitts oscillator circuit, using a 6AK6. Small capacitive variations due to vibration, shock, and internal expansion of the tube elements, are reduced considerably by using 2500 μμfd. of capacitance in the oscillator tank circuit. These capactive variations are reduced still further by short point-to-point wiring wherever possible. The permeability tuned oscillator operates on a frequency of 1.75 to 2.0 Mc., which is doubled in the buffer amplifier stage to produce an output frequency in the range of 3.5 to 4.0 Mc. This frequency range is adequate to cover any amateur band up to 30 Mc. by using the proper amount of frequency multiplication in the mobile rig itself. Doubling in the buffer amplifier simplifies construction by eliminating fancy and extensive shielding of the input and output leads.

The output of the v.f.o. provides more than enough drive for an 807, or similar tube. Actually, it probably will be necessary to detune the buffer tuning control in order to reduce the drive to the proper value. If one prefers, a fixed resistor can be placed in series with the screen grid of the 6AK6 buffer amplifier, to drop the excitation to the proper value. The exact value is best determined experimentally with the v.f.o. connected to the mobile rig. The screen grid should then be by-passed with the addition of a 0.001 μfd. capacitor from screen grid to ground.



←The v.f.o. contains a minimum of parts, and can be readily assembled using this photograph as a guide. Note that the OA2 socket has been recessed for the sake of symmetry.



R1, R2—43,000 ohms, ½w.
R3—560 ohms, ½w.
R4—4,000 ohms, 5w.
R5—4,000 ohms, 10w.
C1, C2—0.005 µfd.
C3—10 µfd., ceramic
C4, C5, C6, C7—100 µµfd.
C8, C9—0.001 µfd.
All capacitors are mica, rated at 500v.
X1—marker crystal, any frequency between 3.5 and 4.0 Mc.
S1—double pole, two position rotary switch.
L4, L5—2.5 mh. r-f chokes.

Wiring schematic of the v.f.o.

For calibrating purposes, the variable frequency oscillator is changed to a crystal oscillator by the double-throw, two-position switch, *S1.* The output of the oscillator is still fed through the buffer amplifier as before. The crystal used for calibrating can be any crystal of known frequency within the range of the receiving converter. However, for best accuracy it might be best to use one in the mid-band. This will reduce any inherent calibration errors in the converter.

To increase the frequency stability of the v.f.o. against varying plate voltage usually found in mobile installations, the plate voltage of the oscillator tube, as well as the screen voltages of both tubes, are regulated with an OA2 voltage regulator. The value of *R5* given in the parts list is calculated to produce 250 volts to the plate of the buffer amplifier when operating from a 400-volt dynamotor supply. If one intends to operate from a power source of other than 400 volts, this resistor should be changed accordingly. In this case the value can be easily determined by substituting the following expression:

$$R5 = \frac{\text{Voltage of Power Supply} - 250}{.035}$$

Coil Winding Data

L1—15 turns #30 enam. wire, wound the length of National XR-50 coil form
L2—39 turns #30 closewound on National XR-50 form
L3—two turns, hook-up wire wound over L2

The original intention when construction was begun was to include the voltage regulator dropping resistor *R4* and resistor *R5* within the unit itself. However, because of the heat developed by these resistors, it was found that in the best interests of stability to place these two resistors externally. The most convenient place is within the high voltage d-c source itself—the dynamotor.

The v.f.o. shown is built in a home-made aluminum box. The chassis is a *U*-shaped frame only 3 x 3¾ inches. The tubes project from the rear in a horizontal plane. This enables the v.f.o. to be only 1½ inches thick. Mounting the tubes as shown also keeps heat away from the frequency determining elements *L1, C1* and *C2,* thus helping to preserve and increase the stability. The small size makes for short leads and mechanical rigidity which in turn means better frequency stability. For the sake of appearances and uniformity, the OA2 voltage regulator is mounted on stand-offs below the chassis edge. Thus, all the tubes extend the same distance from the rear.

The cover is of the same type *U* construction and is made to fit tightly over the chassis. If one does not have the facilities available, an *ICA Flexi-Mount case, type no. 29438* can be used. This case measures 2¼ x 2¼ x 4 inches. Although this case is of different dimensions than the unit shown, it is still large enough to accommodate all the components.

After the unit has been completed and the frequency range of 3.5 to 4.0 megacycles has been established in regard to the position of the slug in the coil, then the excess threaded shaft on the XR-50 coil form can be cut off to bring the knob closer to the panel.

To install a "calibrationless" v.f.o. such as this in the usual mobile set up, it probably will be necessary to make some changes in the present control circuit. Some means must be provided to turn on both the receiving system and the v.f.o. simultaneously, since this is the way that the variable frequency is determined. The exact method in which this is done is best left up to the individual, since control circuits differ like day and night.

In most rigs there will be enough stray coupling between the v-f-o output and the converter input to provide ample signal pick-up for calibration purposes. However, in the event that there isn't, a small piece of wire can be arranged to run from the converter input contact on the antenna change-

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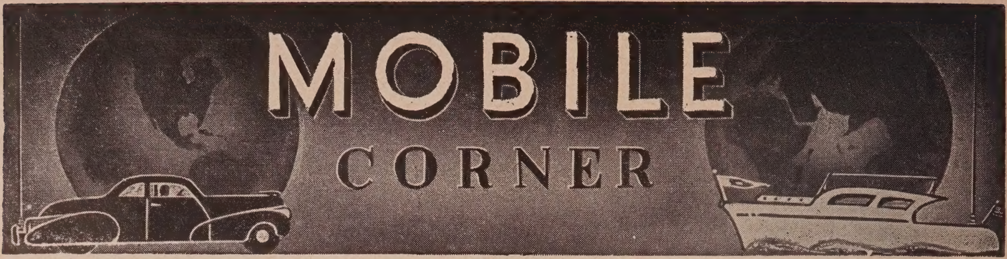
MOBILE CORNER



DON HOLM, W7PFL

P.O. Box 1344, Portland 7, Oregon

Portland's 29.3 Net

Most of the organized mobile activity in the Portland, Oregon area is sparked by an informal group known as the "29.3 Net". It's an unique outfit with no dues, by-laws, officers or meeting hall. Yet the net materializes almost instantly whenever an emergency or disaster occurs, or some recreational activity suggests itself.

It began back in 1946, just after the bands were re-opened. Several of the old-timers around Portland, including Bill Lucas, W7AEF; Verne Bamber, W7AKQ; and Earle Ashe, W7AIZ, back on the air with mobile rigs, got together one night for coffee at a joint with the original and inspiring name of "Greasy Spoon." Bored with the usual signal-report-equipment catalog contact, they were looking for a purpose. Out of this bull-session came the idea for an informal "net" around which any mobile with a 29.3 rock could rally for an emergency or a frolic.

The idea caught on immediately, and the weekly transmitter hunt, which has continued to this day—rain or shine, summer or winter—was the first born of the many activities the 29.3 Net has sponsored or inspired.

Current activities include "Gypsy Tours", "Twilight Tours", the ever-popular "Thursday Night Hidden Transmitter Hunt" and, of course, the usual ARRL events. Most of the gang are members of PARC, OARS, VARC, the Civil Defense group, the Sheriff's Mobile Reserve or some other organized activity. But all you really need to join or take part is a mobile rig and a 29.3 rock.

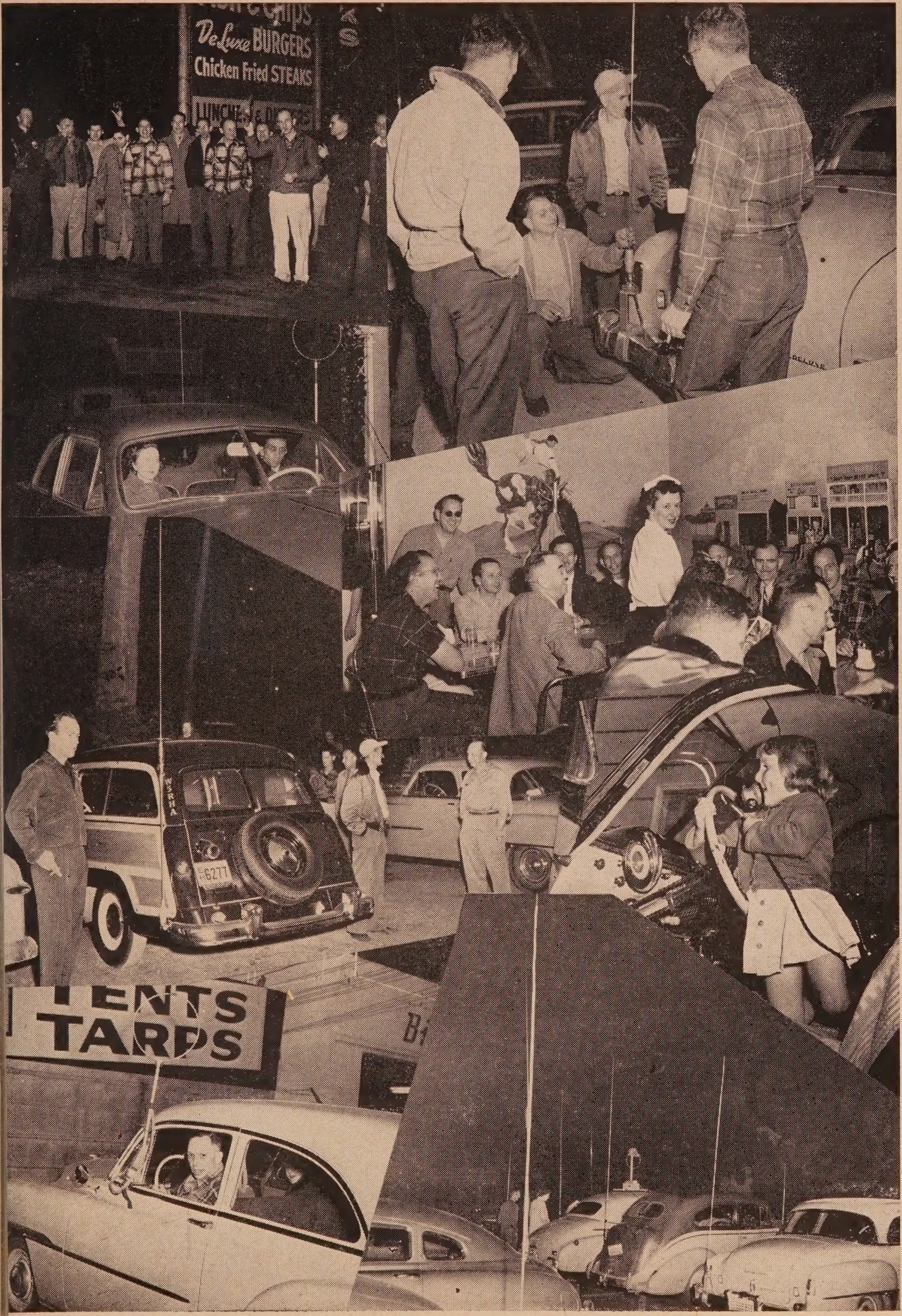
Once born, the 29.3 Net didn't have long to wait for its first real test. The Vanport Flood, of Memorial Day 1948, when a break in the Columbia River levee completely destroyed a war-born city of 30,000, was more of a catastrophe than an emergency. But the mobiles were ready. Within minutes of the break they were on the job supplementing the overtaxed official communications facilities.

Working with the Red Cross, the Sheriff's office, the Salvation Army and other disaster units, the Hams remained on the job for hours and days at a stretch, not only at the scene of the Vanport break, but stationed out on weakened dikes for a 30-mile stretch up and down the river. One mobile, jalopy and all, was marooned for several hours on a crumbling dike surrounded by water. Another, exhausted from lack of sleep, lost his car when he dozed off and drove into the river. Still another stayed on duty on Sauvies Island without food or sleep for 48 hours before he was taken off by the Coast Guard.

With all landline communications cut off between Portland and nearby Vancouver, Wash., the Hams handled thousands of messages back and forth across the river. Earle, W7AIZ, whose *HT-19*

OLD
OREGON TRAIL

W7GCT passes W7PFL on the Old Oregon Trail.


DeLuxe BURGERS
Chicken Fried STEAKS
LUNCHES
TENTS
TARPS

Scenes at some of the Portland 29.3 Net Activities.

never cooled off for days on end, kept his home station on the air as an official relay point. Other stations handled messages from worried relatives and friends in every state and several countries.

The full story of the part played by Hams, especially the mobiles, in this disaster, has never been told, and probably never will, mostly because of the almost exasperating modesty of the operators who took part. Some of the mobiles, though, who were on the job continuously, were Zelmar Sax, W7FJZ; Verne Bamber, W7AKQ; Earle Ashe, W7AIZ; Byron Peffly, W7BKC; Bill Lucas, W7AEF; Clyde Sylvester, W7KSA; and Hal McCracken, W7WJ. There were others who also deserve credit but whom this reporter has been unable to flush out or make own up.

Other emergencies since then—forest fires, lost hunters and local storms—have all been taken in stride with an efficiency that amazes authorities.

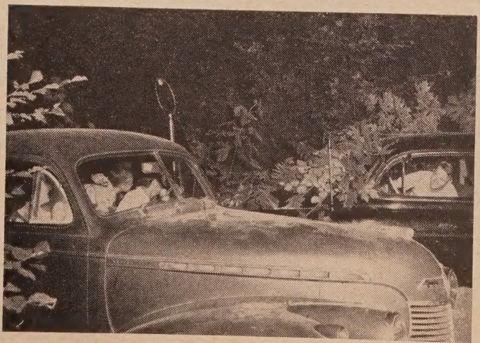
For the most part, however, the activities are fun fests, like Community Chest drives, acting as relay points for cross-country auto races, the Gypsy and Twilight tours, and hidden transmitter hunts. These activities have drawn as many as 40 to 50 mobiles at a time (30 is a good average), with interest kept alive by such early members as W7AIE, ACZ, BKC, FFJ, GOF, GCT, HAE, HCQ, HFZ, HTX, IE, IYY, IIV, IIA, JSK, LMM, LXR, LVQ, NGG, NDB, NQB, OAU, OGI, OBJ, and OZG.

The tours are held during the good-weather months. "Gypsy Tours" begin about 0900 on Sundays when the *Coordinator of the Month* announces the rendezvous point and calls the roll. Then a caravan is made up for all-day trip to the beaches, or to a wilderness mountain lake in the High Cascades. Saturday evenings, on alternate weeks, "Twilight Tours" assembles at the *Coordinator's* call at about 1700 hours. A caravan then leaves for a nearby park or beach for an evening of fun. Caravans are gay affairs with all the cars—which are loaded down with XYL's, YL's, Junior Ops, friends and relatives—all trying to talk at the same time, asking directions or ragging each other. Sheer pandemonium. At the destination games and bull-sessions are in order, as well as picnic lunches or suppers. Movies are shown after dark, and, towards midnight, the caravan heads home, and as the family and relatives sleep, the Hams have the air to themselves.

The "Thursday Night Hidden Transmitter Hunt" has been carried on without a break since it began—even during "silver thaws" and snowstorms. Promptly at 1930 each Thursday the *Coordinator,* who is parked atop "CQ Mountain"—otherwise known as Rocky Butte, one of Portland's several hills—calls the roll and announces the hidden transmitter for the night. Then the mad scramble is on, covering Portland's 67 square miles of streets, alleys, forest and waterfront in several sectors. The rules restrict the mobiles to public property and to the city limits. Many ops use loops for taking bearings, while others rely merely on the whip an *S*-meter. Some of the older hands, who are hep to the tricks a ten-meter signal will pull in various sectors, can almost tell from listening to a signal where it comes from. The newer members find they have a lot to learn—not only about the city, but how tricky a signal can be.

But even old-timers get fooled. Like the time Bob Greer, W7GCT, climbed Mount Tabor, an extinct volcano, with a kiddies' wagon and a portable battery rig. With a dipole stretched out in the grass, sitting crosslegged on the wagon under a huckleberry bush, Bob qualified technically as a mobile and yet managed to keep 50 wheezing geezers beating the bushes half the night. No one will ever know how many startled lovers the guys flushed like quail that night. This op passed within six feet of Bob at one time and failed to find him!

After the hunts, the mobiles usually rendezvous at a drive-in for chow and coffee, to meet each other face to face in the case of newcomers. Portland's Hams are a gregarious gang. An innocent announcement over the air that the coffee pot is perking is enough to bring mobiles from all over the city, converging on a hapless station-bound Ham like a convention of cops. Once, when this happened, a luckless passer-by dropped a bundle he was carrying and took off like a gazelle. Probably hot cargo.


W7HAE discovers the hidden transmitter maintained by W6KTE (at the right).

A picnic dinner always gives the XYL's a chance to become better acquainted.

the W2AEF Converter-ettes

WILFRED M. SCHERER, W2AEF

Contributing Editor, CQ

Here is an inexpensive solution to the questions and problems raised by the author in his first paragraph. Interchangeable fix-tuned Converter-ettes for the various bands may be installed completely out of sight in the average automobile.—Editor.

With the opening of the 15 and 40-meter bands to phone operation, and with Class B license phone operation now permitted on 20 and 75, many mobile operators, wanting to take advantage of the new regulations, may find themselves without a means of reception on these bands. Also, there may be others desiring to enter the mobile field, but who may be prevented from doing so for lack of an inexpensive method of reception. An inexpensive and simple receiving arrangement may also be desirable for use in automobiles, serving as auxiliary listening units in connection with CD work. In addition, but by no means least, there may be some amateurs who have been thwarted in their attempts at mobile operation, because the XYL does not want the car cluttered up with equipment!

The *Converter-ettes,* such as described herein, are ideal units to cope with the situation. They are simple two-tube fix-tuned converters, with plenty of sensitivity, which may be tucked away behind the dashboard, under the seat, in the trunk, or in the glove compartment. Tuning over the range of a band is done with the dial of the auto broadcast receiver. The *Converter-ettes,* shown here, have each been designed for single-band operation. A bandswitched unit, for all bands, could be made, but this is not warranted, if simplicity and low cost are to be maintained.

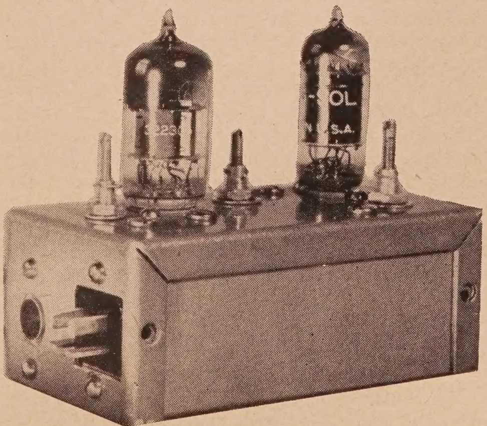
Besides serving as a mobile receiver, a *Converter-ette* may be used at home for fixed station operation, not only as a h-f converter, but also as an r-f amplifier and pre-selector, in which manner it will really pep up that old communications receiver, and at the same time, improve its image rejection.

The circuit diagram for the *Converter-ettes* is shown in *Fig. 1.* The r-f stage employs a 6BH6 pentode, the grid circuit of which is peaked to the center of the band by means of the slug in *L2.* Response is sufficiently broad for satisfactory gain over any one band. From the *Coil Table* it will be noted that fixed capacitors are added across both These bands have a high bandwidth ratio and there-the r-f and mixer inductors on some of the bands. fore do not require a high degree of broadband tuning as do the other bands. Capacitor padding improves image rejection in the specified cases.

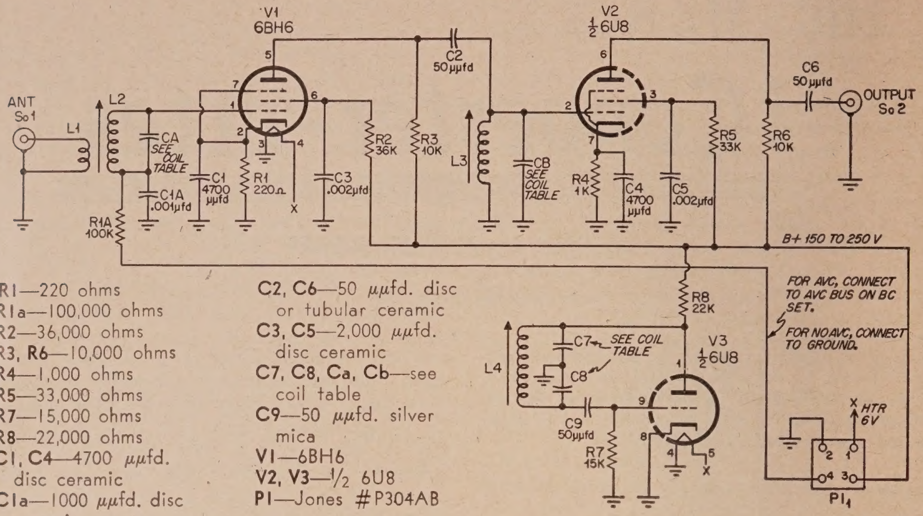
The 6BH6 was chosen because it provides high gain with a noise figure lower than that found with the other tubes tried in this particular arrangement. 6CB6, 6AK5, 6BA6, 6AU6, etc., may be used since from the practical standpoint, the attainment of the lowest noise figure may be a bit superfluous as far as mobile operation is concerned.

For CD work, or for other cases where very strong local signals may be encountered, provision has been made to use a.v.c. on the r-f stage to reduce front-end overloading and cross modulation.

The mixer-oscillator employs a 6U8 triode-pentode dual purpose tube. The pentode section is used as the mixer, while the triode portion is used as the h-f oscillator. Other mixer tubes such as the 6X8 and the 6BA7 were tried, but the 6U8 provided the best all around performance consistent with high gain, low noise, oscillator stability, and minimization of oscillator pulling, to be found in



The complete Converter-ette. The mixer section is to the left, and, from left to right, the tuning slugs L4, L3, and L2.



R1—220 ohms
R1a—100,000 ohms
R2—36,000 ohms
R3, R6—10,000 ohms
R4—1,000 ohms
R5—33,000 ohms
R7—15,000 ohms
R8—22,000 ohms
C1, C4—4700 μμfd. disc ceramic
C1a—1000 μμfd. disc ceramic
C2, C6—50 μμfd. disc or tubular ceramic
C3, C5—2,000 μμfd. disc ceramic
C7, C8, Ca, Cb—see coil table
C9—50 μμfd. silver mica
V1—6BH6
V2, V3—½ 6U8
P1—Jones #P304AB

Fig. 1. Wiring schematic and parts list.

one tube. The double triodes popularly used in many converters did not perform as well, especially in regards to high gain, in which case their output level was too low to satisfactorily feed the ordinary car radio in a simple and inexpensive manner.

It will be noted that the output of the 6U8 mixer tube is fed directly to the input of the auto radio through a resistance coupled coaxial line. No special output circuits or low-impedance links are required. This manner of coupling furnishes an output level higher than that found with some of the more conventional methods; in fact, the output from the *Converter-ette* is so high that in many installations it may be necessary to pad it down to prevent overloading and excessive a-v-c action in the broadcast set from only average ignition noise pulses.

The h-f oscillator employs a fixed-tuned Colpitts circuit. Stray oscillator coupling to the mixer is sufficient through the tube. Similar types of broadband converters often employ crystal oscillators to realize stability, however, the oscillator used in the *Converter-ettes* has proven to be stable, and no voltage regulation is required. This is possible through the use of good components plus a fairly high *C* oscillator circuit. The high *C* also reduces oscillator harmonics and thereby minimizes the possibility of "image" reception of signals from harmonically related higher frequency bands.

Construction

The construction of the *Converter-ettes* is easy and quite straightforward. They are built on 4″ x 2⅛″ x 1⅝″ chassis (*Bud Minibox*). An aluminum shield, 1⅞″ wide and 1½″ high, separates the r-f stage from the mixer-oscillator section. The r-f section contains the following components, besides the tube socket for *V1*: *L1, L2, C1, C1A, C3, R1, R1A, R2* and *So1.* A three-terminal tie strip is mounted along the mixer side of the chassis. One end of *R2* is connected directly at the socket of *V1, pin 6;* the other lead of *R2* is insulated, and, after passing through a ¼″ hole in the shield, it is connected to a common B plus terminal on the tie strip in the mixer section. One lead of *R3,* located in the mixer section, is connected directly to the common B-plus tie point. Its other lead is insulated, and, after passing through a separate ¼″ hole in the shield, it is connected directly to the socket of *V1, pin 5.* One lead of *C2* is connected to the end of *R3* before the latter passes through the shield hole, and the other lead of *C2* connects to the grid terminal of *L3* which is located near the shield partition. This grid terminal is the end of the winding at the top of *L3.* The ground side of *L3* is located at the end of the winding nearest to the chassis.

Resistors, *R5, R6* and *R8* are connected directly between their respective terminals on the *V2* socket and the common B plus tie point. The heater lead for *V1* is also brought through a separate small hole in the shield, and it is connected to a common heater tie point terminal.

R1, R4 and *R7* are installed right at their respective socket terminals, and they lie near the chassis with their ground ends connected to soldering lugs secured by the socket screws. One end of *R1A* is connected directly at the bottom end of *L2;* the other end is connected to an insulated wire which is in turn connected to an a-v-c tie point terminal in the mixer section.

The oscillator capacitors, *C7* and *C8,* are installed vertically along the side of *L4,* away from the chassis to minimize heat pickup and to allow free air circulation around them. They are firmly secured by a short lead to a ground lug. The plate end of *C7* should be connected directly to the terminal on *L4* nearest the chassis. *C9* should be connected to the grid terminal of *L4* (the one farthest from the chassis) by a very short lead, leaving the lead to be connected to the tube socket (the longer one).

Since they stand up in the air, so to speak, *C1, C1A, C4, C5* and *C6* should be installed last.

Power leads for the *Converter-ette* may be connected directly to the tie point terminals. If desired, a *Jones* plug may be mounted on the chassis, instead of using permanent leads, so that *Converter-ettes* for different bands may be plugged in at will.

Tube shields are not used because they really are not required; their use would transmit an excessive amount of heat from the tubes to the chassis. Good quality ceramic or mica-filled sockets hold the tubes securely in place without the aid of shields.

Adjustment and Operation

For 28-Mc band operation, the oscillator should be tuned to 28 Mc. This may be done by using a grid dipper, without power being applied to the oscillator, but with the tube in the socket. With power applied, the oscillator may be checked for oscillation while using the grid dipper as an absorption type frequency meter. For better accuracy another receiver, tuned to 28 Mc., may be used, in which case the oscillator slug, in *L4,* should be adjusted until the beat may be heard in the receiver.

When the *Converter-ette* is used with a broadcast set, the h-f range then will cover 28 Mc. plus the frequency to which the broadcast set is tuned. As an example, if the BC set covers 500 to 1600 kc., the h-f range will be 28.5 to 29.6 Mc. The low frequency range on many BC sets begins at 550 kc., in which case the h-f range would start at 28.55 Mc. In this case, if it is desired to cover down to 28.5 Mc., the oscillator frequency will have to be lowered to 27.95 Mc. This, of course, will also reduce the upper frequency limit. If it is desired to bring the top of the range to 29.7 Mc., then the oscillator frequency will have to be raised to 28.1 Mc.

Next, if a grid dipper is available, remove heater and plate power from the *Converter-ette,* and peak the r-f and mixer inductors to between 30 and 31 Mc. Then short the two ends of the oscillator inductor, and apply both heater and plate power to the unit. Recheck the inductors by using the grid dipper. Because of the loading of the tubes on the low *C* circuits, the *Q* will be lowered, and it may be difficult to obtain a dip on the meter. If a dip is readable, the frequency will be lower because of the change of the tube capacitances when power is applied, and it should fall near, or be adjusted to, the center of the band.

If a grid dipper is not available, the mixer and r-f inductors should be tuned as follows: (re-trimming should be made in this manner in any case).

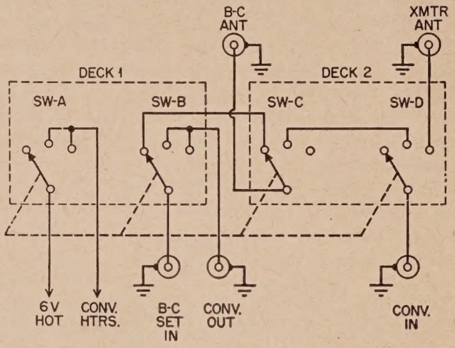


Fig. 2. This is the separate switching circuit used by the author. It provides a choice of antennas for broadcast reception as well as for switching the Converter-ette into the broadcast receiver.

Connect the output of the *Converter-ette* to the input of a receiver having an *S*-meter which may be used as a visual peaking indicator. If it is necessary to use a receiver not having a meter, disable the a-v-c circuit and use the loudspeaker or headphones to make peaking adjustments by ear. Do not connect any antenna to the *Converter-ette* at this time. Set the receiver near 1000 kc. Apply power to the *Converter-ette,* and be sure its oscil-

Coil Table for the W2AEF Converter-ettes

Frequency	L1	L2	Ca	L3	Cb	L4	C7 & C8 (silver mica)
28 Mc.	2 turns #20 plastic	19 turns #24 en.		17 turns #24 en.		14 turns #26 en.	100 uufd.
21 Mc.	2 turns #20 plastic	20 turns #24 en.	5 μμfd.	18 turns #24 en.	5 μμfd.	18 turns #26 en.	100 μμfd.
14 Mc.	3 turns #20 plastic	25 turns #28 en.	10 μμfd.	25 turns #28 en.	10 μμfd.	22 turns #28 en.	100 μμfd.
7 Mc.	6 turns #24 en.	45 turns #34 en.	10 μμfd.	45 turns #34 en.	10 μμfd.	35 turns #32 en.	200 μμfd.
4 Mc.	16 turns #34 en.	100 turns #36 en.	10 μμfd.	100 turns #36 en.	10 μμfd.	75 turns #36 en.	200 μμfd.

L1 --wound around bottom turns of L2, first wrap scotch tape around L2.

L2 & L3 --wound on 3/8" dia. slug-tuned ceramic forms -- CTC LS5

L4 --wound on 1/4" slug-tuned ceramic form, CTC LS6 lator is functioning at the correct frequency. Back off the slugs in *L2* and *L3* all the way counterclockwise. This is the highest frequency position. Now turn *L3* (mixer) slug clockwise until the thermal noise peaks, as indicated by the *S*-meter or by ear, as the case may be. Note this point and again rotate the slug clockwise until a second noise peak is found. This second peak will be that on the low frequency side of the h-f oscillator, and it is the INCORRECT one to use, but it should be checked in this manner so that it may be found which frequency actually is being peaked. Now rotate the slug back counterclockwise to the first peak originally encountered.

Next turn *L2* (r-f) slug clockwise until the noise is peaked further. This should be the correct point on the high frequency side of the h-f oscillator, but the following additional check should be made:

First note the number of turns required from the maximum counterclockwise position to the point where the peak just found on *L2* has been determined. Then set the slug back at maximum counterclockwise, and tune the slug in *L3* (mixer) clockwise to its second or INCORRECT peak as described above. Then tune *L2* for a maximum peak, and count the number of turns from maximum counterclockwise at which the peak occurs. This should be a greater number of turns than counted with the first peaking of *L2*. Both settings of *L2* and *L3* will be the INCORRECT ones, since they are both tuned to the low frequency side of the oscillator, or at the image of the desired frequency. Here again, this operation, is advisable just to check the correct peaking points.

Finally set both slugs back to their maximum counterclockwise positions, and proceed to tune them to the CORRECT points by selecting the first peak (tuning in the clockwise direction) with *L3* (mixer), and then by peaking *L2* (r.f.) at the number of turns first counted. When the antenna is connected to the *Converter-ette,* it may have some reactance which may be tuned out by slightly re-peaking *L2*.

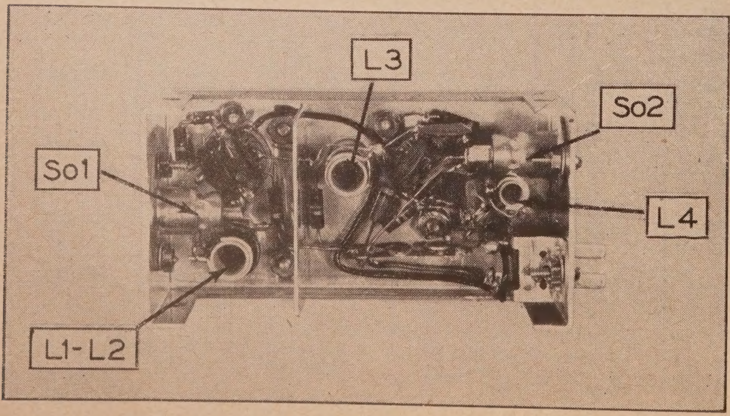
Final frequency calibration should be checked by tuning in signals of a known frequency. If the h-f oscillator is operating at exactly 28 Mc., the dial of the broadcast set will serve as the calibration for the whole band, and reference may easily be made by adding the broadcast frequency to 28 Mc. 600 kc. on the dial then becomes 28.6 Mc., 700 kc. becomes 28.7 Mc., 800 kc. becomes 28.8 Mc., etc. If the h-f oscillator has to be shifted to take in the extremes of the band, as described earlier, then the dial calibration will be different by the amount the oscillator has been shifted.

The *Converter-ettes* for the other bands are lined up by following the same procedure as for 28 Mc., except that the oscillator frequency is tuned to the desired frequency minus that at which the broadcast set is to be tuned. For example, on 14 Mc. it may be desirable to select 1000 to 1400 kc. for the tuning range so that the calibration will fall in line, making 1000 kc. equal to 14 Mc., 1100 kc. equal to 14.1 Mc., etc. In this case the h-f oscillator must be tuned to 13 Mc.

On the other hand, the bandspread of the broadcast set may be too cramped in this range, in which case it may be more convenient to use, say, 600 to 1000 kc. as the range. It is suggested that the range having the greatest bandspread be used, and if the b-c dial is quite uniform, giving a choice of ranges, it is best to select the highest frequency end to obtain the best image rejection. Peaking of the r-f and mixer inductors should be made at the center of the band used.

Upon installation in the car, any length of shielded antenna cable may be used to connect the *Converter-ette* to the broadcast set. In most cases it may be desirable to provide a switching arrangement, with appropriate shielded connectors, to change between *Converter-ette* and b-c reception. This may be made up in a separate small unit which may be mounted in an inconspicuous, but convenient, place. The circuit for one such arrangement, as used by the writer, is shown in *Fig. 2.* A three-position switch is used, which not only permits the choice of normal broadcast reception on the b-c set, or h-f reception through the *Converter-ette,* but

(Continued on page 105)



Under chassis view of the Converter-ette showing the location of the coils and sockets. The r-f is on the left, the mixer and oscillator are on the right.

— Ten is ¼ for Ten —

ROBERT M. FIELD, W1PMY

32 Highland Lane, Bangor, Me.

Bob Field's experiences with his ten-meter mobile antenna is yet another indication that optimum performance from any amateur station, either mobile or fixed, requires careful adjustment of the antenna to meet individual conditions.—Editor.

The whole thing started with Bill Clark, W1MAW, discussing ten-meter mobile antennas. He said, "You won't find it in the books, Bob. But, if you add a foot or so to an eight-foot whip, it will load better on 10, and your signal will come up an *S*-point. Even if you figure an *S*-point as three db.,* that's practically doubling your effective radiated power."

Well, you don't argue with Bill, unless you're the guy who taught Terman, so I tucked that bit of information away for future need. I decided to experiment on this basis when the local CD net was organized on 29,520 kc., and W1PMY went mobile. For an antenna, I bolted an eight-foot, receiving-type whip to the side cowl of my Jeep station wagon. It did not accept power from the transmitter very readily, however, and the receiver was kind'a numb, too.

Establishing Antenna Resonance

It seemed about time to confirm Bill's theory about antenna length. I shorted the feed-through bolt from the antenna to the frame inside the Jeep. Then I coupled a grid-dip meter to the base of the antenna by sticking its coil between the antenna and car frame. By using tight coupling, I found a slight, broad dip around 35 Mc.

I wired a foot-long piece of copper tubing to the whip, yard-arm style, which brought the dip down to 33 Mc. Next, I tried a jury-rig capacity hat made of small wire, with the same results. Both loading devices had to be near the top of the whip to have much effect on its resonant frequency. The thought of cruising around our tree-blessed city with a saucer balanced on top of the whip horrified me. It appeared that, unless I used base loading, I would have to lengthen the whip. I achieved this with a three-foot piece of stiff wire, and then varied the overall length at one of the telescoping joints until I obtained a deflection on the grid-dip meter at 29.5 Mc. The rig now loaded perfectly, and the receiver perked up nicely, so I replaced the temporary extension with a permanent one and resonated the antenna again. The final length was 9′ 10″.

Why So Long?

Hoping to find some explanation of why the whip had to be so long, I compared the lengths necessary to establish resonance at several frequencies with the theoretical lengths of quarter waves in space at the same frequencies but could obtain nothing that seemed to indicate an outstanding error.

Next, I measured the capacity between the Jeep and the ground system at the WLBZ broadcast tower and then the capacity between the mobile antenna and Jeep. I also made similar measurements on W1QEM's mobile installation. He has an eight-foot *Radelco* whip with a nine-inch spring mount on his 1949 Studebaker "Land-Cruiser." I obtained the following figures:

Here is the author in action with his Jeep Station Wagon at the Brewer (Maine) Raceway.

	W1PMY	W1QEM
Capacity, Car to ground:	600 μμfd.	1500 μμfd.
Capacity, Whip to Car:	60 μμfd.*	42 μμfd.*
Whip length:	9′ 10″	8′ 9″
Resonant frequency:	29.5 Mc.	29.2 Mc.

These figures seem to indicate that an automobile body in conjunction with a ¼-wave whip does not act as a ground-plane antenna on ten meters. Rather, the automobile body acts as a capacity, in series with the whip, to ground, thereby shortening its electrical length. This made everything seem

(Continued on page 109)

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* An S unit is usually considered equivalent to six db. —Editor.

* Estimated 10-μμfd. residual capacity of capacity bridge subtracted from reading.

Report on the GONSET Converters

The *Gonset Super-Six* is the third in a line of very popular mobile converters. As the name implies, the *Super-6* has bandspread calibration or "positioning" on six amateur bands; 10, 11, 15, 20, 40 and 75 meters. In addition, the 19- and 49-meter short wave broadcast bands are spotted on the dial. This brings the unit right up to date and affords adequate mobile coverage.

Circuitry

Although the tried and proven tube lineup is the same in the *Super-6* as it has been in the *Tri-Band,* etc. (6CB6 r.f., 6AV6 mixer, 6C4 osc. and 6BH6 i.f.) a number of important changes have been made. The i-f channel has been dropped 10 kilocycles and a wave trap on 1430 kc. is permanently inserted in the high impedance antenna lead. This trap is tuneable through a slug on the back plate of the converter. In the model tested by *CQ* this slug had been preset at the factory and required no further adjusting once the car receiver had been carefully set on 1430 kc. A second useful trap appears in the antenna lead to the 20-meter coil. This trap is not adjustable, but apparently is very effective in removing strong 10-meter signals that might ride through into the 20-meter band.

Probably the most important improvement in the *Super-6* r-f stage has been the incorporation of an r-f gain switch which puts 1200 ohms additional resistance in the cathode circuit. On 20, 40 and 75 meters this "Lo" r-f gain position very noticeably reduces the over-all background noise level when tuning the band between stations without loss of sensitivity in the system. In the mobile receiver installation tested by *CQ* the gain of the r-f stage was always reduced on every band except 10-meters, where 50% of the signals heard were other mobiles and the additional gain was warranted.

All of the *Gonset* converters have been provided with a 5 $\mu\mu$fd. oscillator "compensator" (or index) to true up the dial calibration. In the *Super-6* the "compensator" is brought out on the rear lip of the chassis and the necessity of having to touch this control notably reduced through the addition of individual 10, 40 and 75-meter oscillator trimmers. In previous circuits only the 75-meter band had this adjustment. As the unit arrives from the factory all of the bands have been carefully preset, and in the unit under test the "compensator" readily brought all of the bands within dial calibration and has not been retouched after 1000 miles of operation.

Purchasers of the *Super-6* will also be pleased to see that a jack has been brought out to the rear of the chassis for the lead from the standard broadcast whip antenna. A new antenna switch on the front panel automatically re-connects the broadcast antenna in place of the converter output when the XYL insists on listening to Arthur Godfrey. A second switch on the front panel turns off the tube filaments. Thus the panel controls have been greatly simplified, and the important ones (on the rear panel) are not likely to get out of adjustment.

The oscillator voltage in the *Super-6* has been reduced, and a separate lead is brought out from the plate circuit. This lead may be required if a "Signal Slicer" is to be used in conjunction with the receiver. In this case the oscillator stability could be maximized by feeding it from 90 to 135 volts of B batteries which should last 1½ to 2 years. However, in the average installation the oscillator voltage may be obtained directly from the receiver, as the drift of the converter is certainly negligible.

If you are prone to compare the *Super-6* with the *Tri-Band* you will immediately note that the logging scale has been replaced with a fourth tuning range. While the loss of this scale is a matter of individual preference it is about the only serious objection *CQ* had on the over-all operation of the *Super-6.* The sensitivity, stability and ease of handling are all still tops for a mobile converter in a small package.

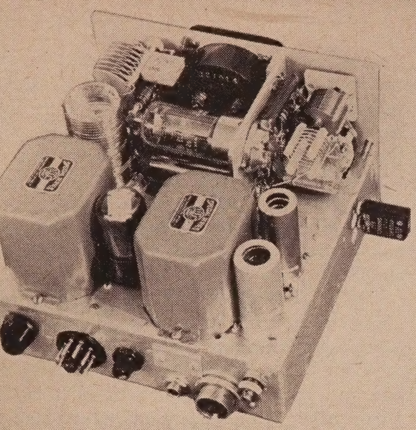
12-Volt Operation of the Gonset Converters

The Gonset *Tri-Band* or *Super-6* converters may be easily modified for 12-volt operation. The simple changeover (as recommended by the factory) is described below and puts the 6AV6 and 6CB6 heaters in series and the 6C4 and 6BH6 heaters in another series across the filament supply.

Start with the 6AV6 and isolate *pin 3* from ground, but replace the original ground connection to *pin 2* and the center shield. Remove the connection between *pin 4* of the 6AV6 and *pin 4* of the 6C4. Do not remove the original connection between *pin 4* of the 6CB6 and *pin 4* of the 6AV6. Also do not touch the connection between *pin 4* of the 6C4 and *pin 4* of the 6BH6.

Now lift *pin 3* of the 6BH6 from ground and connect a new lead from this pin to *pin 3* of the 6AV6. Be sure to replace the ground connection

(Continued on page 95)



THIRTY WATTS ON FIVE BANDS

EARL E. FERGUSON, OX3BI/W4SIA

c/o NBS Ionosphere Station, APO 858, c/o Postmaster, New York, N.Y.

The versatility of this mobile transmitter speaks for itself. Capable of bandswitching to any one of five bands, featuring negative peak limiting on phone, compact size and even CW operation, what more can we ask for?—Editor.

It is felt that it would be of interest to present a description of the AM mobile transmitter that is interchangeable with the SSB mobile transmitter featured in this issue of CQ magazine.* The main advantage of this unit is its great flexibility. Using a simple system of bandswitching, this transmitter operates on all bands from 75 through 10 meters.

The Circuit

Examination of the schematic diagram, *Fig. 1,* will reveal that the circuit is standard with no tricks employed.

The r-f portion consists of two stages with a 6AQ5 as a tri-tet crystal oscillator driving a 2E26 final amplifier straight through on all bands. Crystals in the 6 to 8 Mc. range are used for operation in the 40, 20, 15, 11 and 10-meter bands. Three megacycle crystals are used for 75-meter operation. Operation in the oscillator is straight through on 75 and 40, doubling on 20, tripling on 15 and quadrupling on 11 and 10 meters. Sufficient drive (2-plus ma.) is easily obtained when quadrupling with a normally active 7-Mc crystal. In order to control the excessive drive on the lower bands a potentiometer, *R3,* has been placed in the oscillator screen circuit. This allows the oscillator plate circuit to be properly tuned at all times. A molded composition unit such as the *Allen Bradley* Type J or *Ohmite* type AB is recommended for this application because of their small size combined with a conservative power rating. The oscillator plate coil is made in two sections in order to obtain optimum drive on 10 and 11 meters. The 10/11 meter section, *L1,* is made of five turns of a *B. & W.* 3010 Miniductor. It is joined to a 40-turn piece of 3012 Miniductor, *L2,* which is tapped (by pushing in turns toward the center on each side of the tapped turn and soldering to the turn left standing) 3, 6 and 15 turns from the junction with *L1.* These two coils should be separated from each other and *L1* should be in the clear as much as the constructor can make possible. Using *Sw5,* portions of *L2* are shorted out to obtain resonance on the various bands. For 10/11-meter operation the tap is at the junction of *L1* and *L2.* For 15 meters the tap is 3 turns down from the junction; for 20 meters, 6 turns down; and for 40 meters, 5 turns down. For 75 meters the entire coil is used in series with *L1* and there are no taps to the switch.

The final tank coil is wound with No. 20 (B&S gauge) on a 1¼" dia. form, $2\frac{11}{16}$" long, as shown in *Fig. 2.* Any 1¼" O.D. tube of polystyrene or bakelite can be used, but in this case a form was made by cementing two polystyrene coil forms (*Amphenol 24-4P*) together, after removing the pins and flanges, and cutting the resulting tube to length. A thin piece of polystyrene was cemented across the bottom end, through which screws could be passed to secure the coil to the chassis. The design was settled upon after many tests with the Q meter. The unloaded Q for each band with the unused portion shorted out as it is in actual operation is as follows: 75 meters, 263; 40 meters, 278; 2 meters 270; 15 meters, 280; 10 meters, 268. These values compare favorably with those of single coils of the same dimensions. Pi-network tuning is used in the final tank circuit because it offers the simplest system for band switching and antenna loading adjustment. It is possible to match into any load from 20 to 600 ohms on the 10 to 40-meter bands, but on 75 meters, due to the relatively small tuning range of the tank condenser, it is possible to match only 20 to 100 ohms. If a higher impedance match is desired on 75 meters it can be obtained by adjusting the padder, *C4,* so that the tank circuit will resonate at the desired frequency. The ceramic padders, *C4* and *C5,* have a working voltage rating of 500 but show no signs of breaking down even under modulation. They are the most suitable unit available for this application.

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* see page 15.

For simplicity of construction, the grid and final tank circuits are switched separately. The new *Centralab* series of miniature ceramic wafer switches are perfect for the job. Only five of the six positions available are used and, if desired, the sixth position on the final tank switch may be used to cover the CW portion of 80 meters (with additional turns on the tank coil), or an extra tap may be made on the ten-meter coil, so that six meters may be covered by doubling in the final amplifier.

The r-f voltmeter circuit, connected to the r-f output, is an adaptation of one shown in an article by George Grammer.[1] It gives a maximum reading of about 2 ma. on the 0-10 ma. scale of the meter and will have to be calibrated if it is desired to obtain other than relative output voltage readings. To determine the power output it will be necessary to know the impedance into which the output cir-

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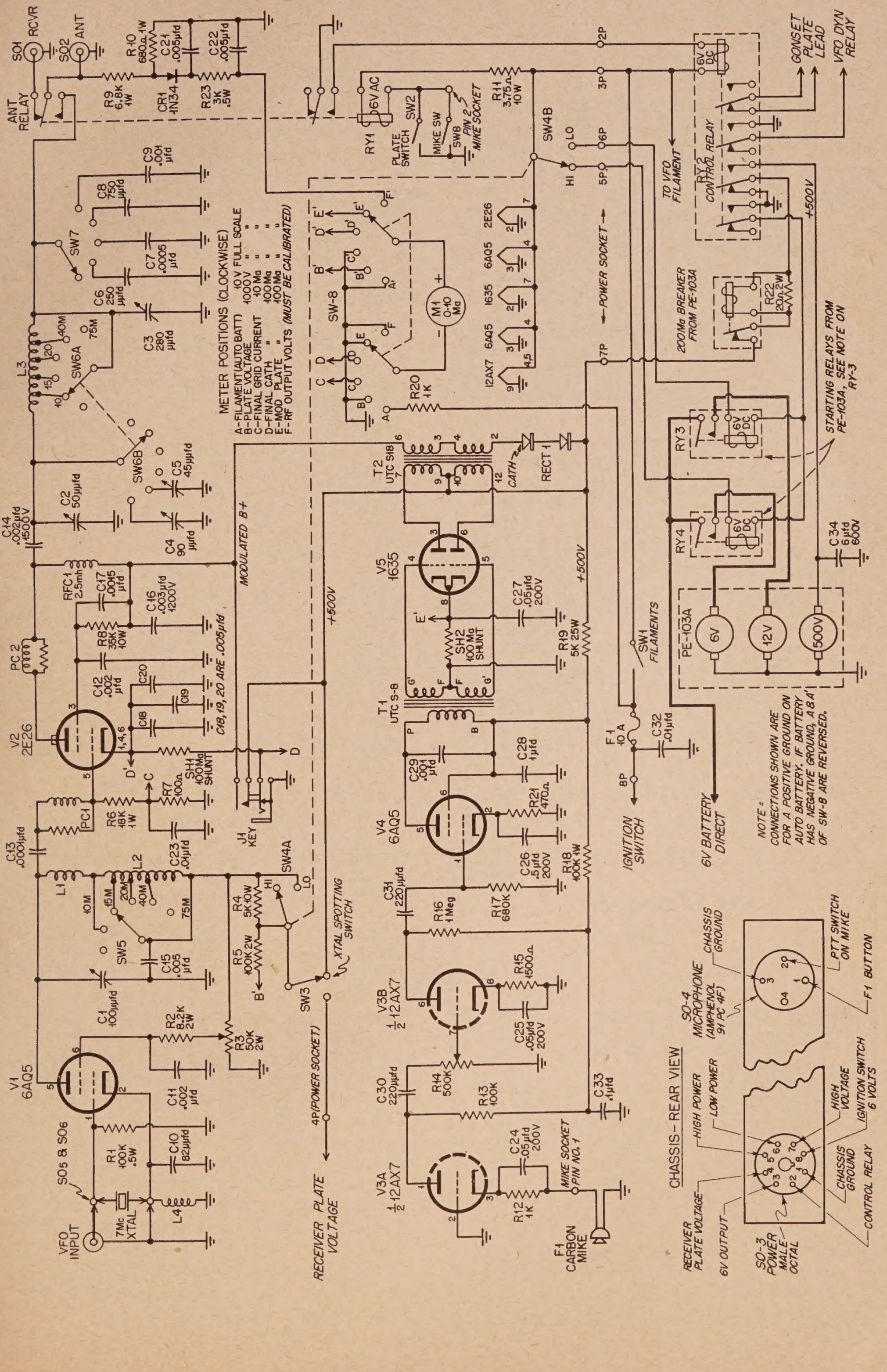
4. Grammer, "R.F. Voltmeters," QST, Sept., 1952 page 29.

Fig. 1. Schematic wiring diagram and parts list.

R1, R13—100,000 ohm, ½w.
R2—8,200 ohm, 2w.
R3—50,000 ohm, 2w. potentiometer, Ohmite type AB
R4—5,000 ohm, 10w. wirewound
R5—100,000 ohm, 2w.
R6—18,000 ohm, 1w.
R7—100 ohm, ½w.
R8—35,000 ohm, 10w. wirewound
R9—6,8000 ohm, 1w.
R10—680 ohm, 1w.
R11—3.75 ohm, 8w. (four 15 ohm, 2w. in parallel)
R12—1000 ohms, ½w.
R14—50,000 ohm potentiometer, 1w. or less
R15—1500 ohms, ½w.
R16—1 megohm, 1w.
R17—680,000 ohm, ½w.
R18—100,000 ohm, 1w.
R19—5,000 ohm, 25w. wirewound
R20—1,000 ohm, 1w.
R21—470 ohm, ½w.
R22—20 ohm, 2w.
R23—3,000 ohm, ½w.
C1—100 µµfd. variable, Hammarlund HF-100
C2—50 µµfd. variable, 1200v. Bud MC-1881
C3—140 µµfd. dual variable, Hammarlund HFD-140, paralleled
C4—two 7-45 µµfd. ceramic trimmers, Erie TS2A, paralleled
C5—7-45 µµfd. ceramic trimmer, Erie TS2A
C6—250 µµfd. mica, 500wv.
C7—500 µµfd. mica, 500wv.
C8—750 µµfd. mica, 500wv.
C9, C29—0.001 µfd. mica, 500wv.
C10—82 µµfd. silver mica, C-D type 22R-5Q82
C11, C12—0.002 µfd. ceramic disc, 500wv.
C13—100 µµfd. mica, 500wv.
C14—0.002 µfd. mica, miniature, 1500wv., C-D type 1WP-15D2
C15, C18, C19, C20, C21, C22—0.005 µfd. ceramic disc, 500wv.
C16—0.003 µfd. mica, 1200v., transmitting type
C17—1500 µµfd. mica, 500wv.
C23, C32—0.01 µfd. ceramic disc, 500wv.
C24, C25, C27—0.05 µfd. metallized paper, Aerovox P82 (200wv.)
C26—0.5 µfd. metallized paper, 200wv., Aerovox P82
C28—1.0 µfd. metallized paper, 600wv., Aerovox P82
C30, C31—220 µµfd. mica, 500wv.
C33—0.1 µfd metallized paper, 400wv., Aerovox P82
C34—6.0 µfd., 600wv., oil filled
T1—class B driver transformer, 5:1, UTC-S8
T2—modulation transformer, Universal, UTC-S18
Sw1, Sw2—s.p.s.t. toggle, bat handle, H&H type 20994 FN
Sw3—s.p.d.t. toggle, bat handle, H&H type 21350 BP
Sw4—d.p.d.t. toggle, bat handle, H&H type 20905 GA
Sw5—SP12T wafer, miniature ceramic, Centralab PA-2001
Sw6—DP6T wafer, miniature ceramic, Centralab PA-2003
Sw7—SP12T wafer, Mallory 32112J
Sw8—DP6T wafer, Mallory 3226J
RFC1—2.5mh., 125ma., National R-100U
PC-1, PC2—parasitic choke, 6 turns, #18 on 100 ohm, 1w. Ohmite "Little Devil" resistor
Sh1, Sh2—100ma. meter shunts: if Triplett 227-T, 0-10ma. meter is used, shunt is 34 inches of #30 formvar on high value 1w. resistor
Ry1—d.p.d.t. miniature relay, 6 VAC coil, P&B type KR11A (or Guardian "200" with M-2 midget contact assembly)
Ry2—4 p.d.t. relay, 6VDC coil (can be two d.p.d.t. units)
Ry3—s.p.s.t. 12v. starting relay from PE-103A (modified for 6v. operation by doubling and rewinding original coil)
Ry4—s.p.s.t. 6v starting relay from PE-103A
M1—0-10ma. 2" square meter, Triplett 227-T
Rect. 1—two 100ma. selenium rectifiers in series (insulated from chassis)
So1, So2—co-ax chassis connectors, Amphenol 83-1R
So3—male octal chassis connector, Amphenol 86-CP8 with adaptor plate
So4—female microphone chassis connector, Amphenol 91PC4F
So5—crystal socket, ½" spacing, 0.095 pins, Millen 33102
So6—crystal socket ½" spacing, 0.125 pins, Millen 33202
J1—key jack, Mallory 704A
Fuse holder (F1-10a.)—Buss panel mounted holder type HJM
V1, V4—6AQ5
V2—2E26
V3—12AX7
V5—1635


SO1 RCVR
SO2 ANT
ANT RELAY
R9 6.8K 1W
R10 680Ω 1W
C21 .005μfd
CR1 1N34
R23 3K .5W
C22 .005μfd
C9 .001 μfd
C8 750 μμfd
SW7
C7 .0005 μfd
C6 250 μμfd
C3 280 μμfd
L3
SW6A
10 15 20 40M 75M
SW6B
C5 45μμfd
C2 50μμfd
C4 90 μμfd
C14 .002μfd 1500V
RFC1 2.5mh
C17 .0005 μfd
C16 .003μfd 1200V
R8 35K 10W
PC 2
C12 .002 μfd
C20 C19 C18
C18, 19, 20 ARE .005μfd
V2 2E26
SH1 400Ma SHUNT
R7 100Ω
R6 18K 1W
PC1
C23 .01μfd
C13 .0001μfd
L1 L2
10M 15M 20M 40M 75M
SW5
C15 .005 μfd
C1 100μμfd
R4 5K 10W
R5 100K 2W
SW4A HI LO
SW3
XTAL SPOTTING SWITCH
R2 8.2K 2W
R3 50K 2W
V1 6AQ5
C11 .002 μfd
C10 82μμfd
R1 100K .5W
SO5 & SO6
VFO INPUT
7Mc XTAL
L4
4P(POWER SOCKET)
RECEIVER PLATE VOLTAGE
MODULATED B+
J1 KEY
+500V
METER POSITIONS (CLOCKWISE)
A-FILAMENT(AUTO BATT) 10 V FULL SCALE
B-PLATE VOLTAGE 1000V " "
C-FINAL GRID CURRENT 10 Ma " "
D-FINAL CATH " 400 Ma " "
E-MOD PLATE " 400 Ma " "
F-RF OUTPUT VOLTS (MUST BE CALIBRATED)
SW-8
M1 0-10 Ma
R20 1K
RY1 6V AC
PLATE SWITCH SW2
MIKE SW SW8
PIN 2 MIKE SOCKET
R11 3.75Ω 10W
SW4B LO HI
2P 3P 6P 5P 7P
12AX7 6AQ5 1635 6AQ5 2E26
POWER SOCKET
TO VFO FILAMENT
RY2 CONTROL RELAY
6V DC
GONSET PLATE LEAD
VFO DYN RELAY
+500V
200Ma BREAKER FROM PE-103A
R22 20Ω 2W
STARTING RELAYS FROM PE-103A, SEE NOTE ON RY-3
RY3 6V DC
RY4 6V DC
C34 6μfd 600V
PE-103A 6V 12V 500V
T2 UTC S18
CATH
RECT 1
V5 1635
C27 .05μfd 200V
SH2 100 Ma SHUNT
R19 5K 25W
+500V
SW1 FILAMENTS
T1 UTC S-8
C29 .001 μfd
C28 1μfd
V4 6AQ5
R21 470Ω
C26 .5μfd 200V
R18 100K 1W
F1 10 A
C32 .01μfd
8P
IGNITION SWITCH
6V BATTERY DIRECT
NOTE: CONNECTIONS SHOWN ARE FOR A POSITIVE GROUND ON AUTO BATTERY. IF BATTERY HAS NEGATIVE GROUND, A & A' OF SW-8 ARE REVERSED.
C31 220μμfd
R16 1 Meg
R17 680K
V3B ½ 12AX7
R15 1500Ω
C25 .05μfd 200V
R14 500K
R13 100K
C33 .1μfd
C30 220μμfd
V3A ½ 12AX7
C24 .05μfd 200V
R12 1K
MIKE SOCKET PIN NO. 1
F1 CARBON MIKE
CHASSIS-REAR VIEW
SO-4 MICROPHONE (AMPHENOL 91 PC 4F)
CHASSIS GROUND
PTT SWITCH ON MIKE
F1 BUTTON
HIGH POWER
LOW POWER
RECEIVER PLATE VOLTAGE
6V OUTPUT
SO-3 POWER MALE OCTAL
CHASSIS GROUND
CONTROL RELAY
HIGH VOLTAGE
IGNITION SWITCH 6 VOLTS

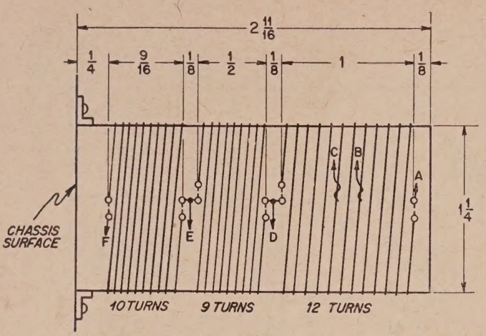


Fig. 2. This sketch shows the construction of L3.

cuit is working. Frankly, the circuit was incorporated in the transmitter to make use of the extra position on the meter switch, and not enough time has been spent in its use to determine the actual value.

The Audio

The modulator portion of the transmitter makes use of the type 1635, zero bias, class B, dual triode. This tube, while not too well known, has been used very successfully in eight other transmitters similar to this one. The tube is rated at 17 watts output with 400 volts on the plates and has consistently given good service in these transmitters with 500 volts on the plates. With this plate voltage, the resting current is about 13 ma., and it is possible to obtain a maximum of 22 watts output from the secondary of the modulation transformer. This should be done for short test periods only. A 6AQ5, in class A, is used as the driver for the 1635; A 12AX7 is used as a voltage amplifier and audio filter ahead of the 6AQ5. The 12AX7 draws less than 2 ma. plate current and eliminates a bulky microphone transformer, as well as providing a means of shaping the audio band pass curve as shown in *Fig. 3.* We attempted to attenuate most of the bass frequencies present in the normal male voice and at the same time emphasize the treble for more effective modulation. After many tests on the air we feel that this has been accomplished. In fact, if the XYL is to do much operating with the transmitter it may be desirable to double the values of *C30* and *C31* to increase the bass response and give a more natural tone. If it is desired to use either a crystal or dynamic microphone in place of the carbon microphone, *R12* can be increased by 1500 ohms and grounded. The low-level microphone could then be connected (with suitable shielding) to *pin 2* of the 12AX7, with a 500,000-ohm resistor from *pin 2* to ground. If additional gain is needed it can be easily obtained by lowering the value of *R16* toward 100,000 ohms as a limit. This latter change would probably not be necessary, as there is plenty of gain with the carbon mike in the cathode and with the gain control, *R14*, about ⅓ on.

Coil Winding Data
(Figure 1)

- **L1**—10/11 meter oscillator plate coil, 5 turns #18, ¾" dia., 8 turns per inch (5 turns of a B. & W. Miniductor).
- **L2**—15/75 meter oscillator plate coil, 40 turns #24, ¾" dia., 32 turns per inch, tapped 3, 6, & 15 turns from L1 junction (40 turns of 3012 Miniductor).
- **L3**—Final tank coil, 31 turns #20 wound on 1¼" dia. form in three sections with 1/8" spacing between sections. Bottom section, 10 turns spaced by inter-winding #28 wire; Middle section, 9 turns spaced by inter-winding #28 wire. Top section, 12 turns spaced by inter-winding #16 wire with twisted taps at 5 and 7 turns from top. See text and Fig. 2.
- **L4**—Oscillator cathode coil, 16 turns #24, 1/2" long, 1/2" dia. (16 turns of 3004 Miniductor).

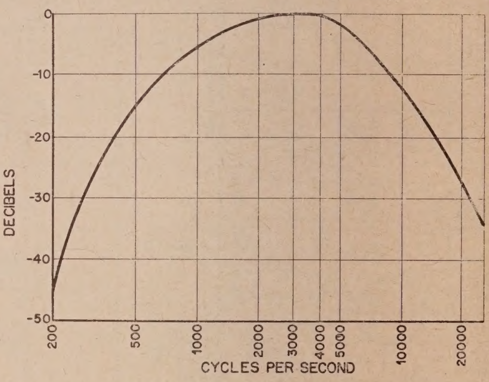


Fig. 3. The audio characteristic of this transmitter is shown in the graph above. Note the attenuation of the bass and treble frequencies to insure crisp modulation. Don't let the XYL use this transmitter—she'll sound awful!

Another item of interest in the modulator is the use of two selenium rectifiers in series between the secondary of the modulation transformer and the high voltage supply. These rectifiers effectively limit the negative peaks of modulation and thereby allow heavier modulation. They should be insulated from the chassis by a small bakelite block, into which their 6/32 mounting screw can be threaded. Many on-the-air checks and bench tests with an oscilloscope have confirmed the fact that this system is very effective and no appreciable splatter or broadening of the signal is present. This may be due, in part, to the fact that the modulator is approaching limiting conditions itself at 100% modulation, and in part to the fact that any high audio frequencies generated by the limiting action of the rectifiers are filtered out by the final screen and plate by-pass condensers.

Remainder of The Circuit

Other features of the transmitter and its power circuit include:

1) Complete metering with filament (auto battery) voltage, plate voltage, grid drive, final cathode current, modulator plate current and r-f output voltage available by setting the meter switch, *Sw8*. Note that the filament voltage connection is taken from the hot side of the filament switch, *Sw1*, allowing the battery voltage to be monitored with the transmitter filaments off.

2) Provision for automatic change-over to CW operation by inserting a key plug in the key jack, *J1*. This automatically shorts the secondary of the modulation transformer and places the key in series with the cathode of the final amplifier.

3) Provision for low (approximately 7 watts) power operation for local contacts or tune up. This is accomplished by using both starting relays that come with the PE-103A dynamotor. The 12-volt relay is rewound for 6-volt operation by removing the wire on the coil, doubling it (use an ohmmeter to find the center), and rewinding the doubled wire back on the core. One of these relays is fastened to the 6-volt winding of the PE-103A, and the other is fastened to the 12-volt winding. During normal operation, the 6-volt winding of the PE-103A is used, but when low power is desired, the switch, *Sw4*, is thrown to "Lo" position, switching the car battery to the 12-volt winding on the PE-103A. This gives about 7 watts input with the transmitter tuned for 30 watts input when on the "Hi" setting. Since the modulator operates from the same source, the modulation level drops accordingly. This switch may be operated at any time. Operating checks show about a 2 *S*-unit change at the receiving end when *Sw4* is thrown. The use of the "Lo" power position also saves a 10-ampere drain from the car battery due to the lower current demanded by the PE-103A.

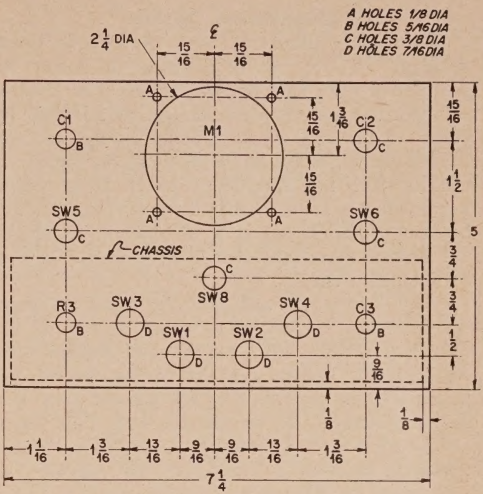

A HOLES 1/8 DIA
B HOLES 5/16 DIA
C HOLES 3/8 DIA
D HOLES 7/16 DIA
2 1/4 DIA
℄
15/16
15/16
A
A
A
A
C1
B
M1
15/16
1 3/16
C2
C
15/16
15/16
1 1/2
5
SW5
C
SW6
C
CHASSIS
3/4
C
SW8
3/4
R3
B
SW3
D
SW1
D
SW2
D
SW4
D
C3
B
1/2
9/16
1/8
1/8
1 1/16
1 3/16
13/16
9/16
9/16
13/16
1 3/16
7 1/4

Fig. 4. Suggested front panel layout.

4) Provision for applying the receiver plate voltage to the crystal oscillator only, for frequency spotting purposes. Note that with the frequency spotting switch, *Sw3*, on and the meter switch, *Sw8*, set to read plate voltage, the receiver plate voltage appears on the meter whether the transmitter is on or not.

5) Protection of the high voltage power supply by using the 200-ma. breaker from the PE-103A. With the coil shunted by the 20-ohm resistor, *R22*, the rating is increased to 300 ma., and the breaker does not kick out on modulation peaks.

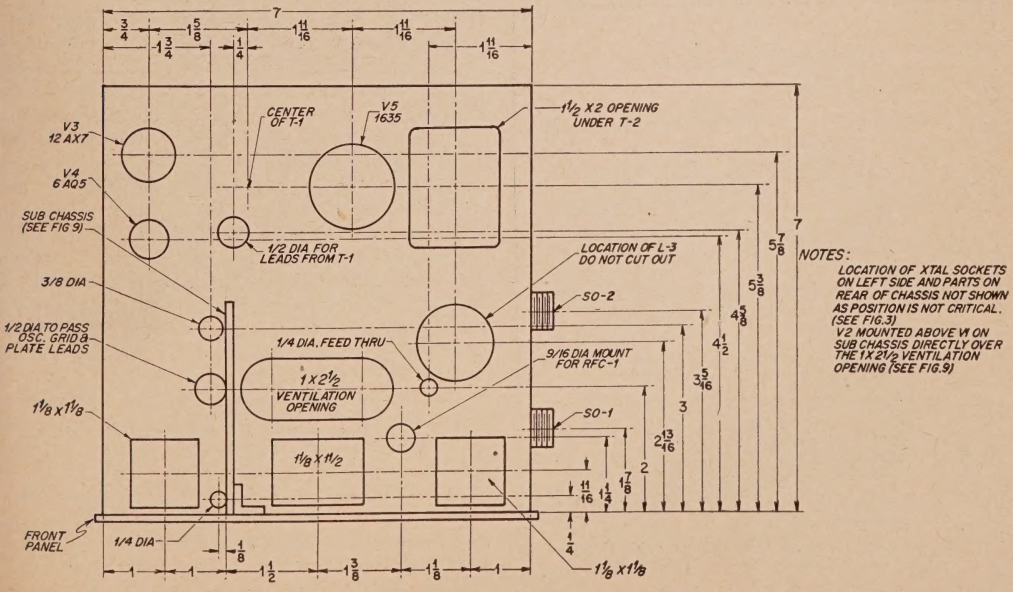

7
3/4
1 5/8
1 11/16
1 11/16
1 3/4
1/4
1 11/16
V3 12AX7
V4 6AQ5
SUB CHASSIS (SEE FIG 9)
3/8 DIA
1/2 DIA TO PASS OSC. GRID & PLATE LEADS
1 1/8 x 1 1/8
FRONT PANEL
1/4 DIA
CENTER OF T-1
V5 1635
1 1/2 X 2 OPENING UNDER T-2
1/2 DIA FOR LEADS FROM T-1
LOCATION OF L-3 DO NOT CUT OUT
SO-2
1/4 DIA. FEED THRU
1 X 2 1/2 VENTILATION OPENING
9/16 DIA MOUNT FOR RFC-1
SO-1
1 1/8 X 1 1/2
7
5 7/8
5 3/8
4 5/8
4 1/2
3 5/16
3
2 13/16
2
1 7/8
1 1/4
11/16
1/4
1/8
1
1
1 1/2
1 3/8
1 1/8
1
1 1/8 x 1 1/8
NOTES:
LOCATION OF XTAL SOCKETS ON LEFT SIDE AND PARTS ON REAR OF CHASSIS NOT SHOWN AS POSITION IS NOT CRITICAL. (SEE FIG.3)
V2 MOUNTED ABOVE V1 ON SUB CHASSIS DIRECTLY OVER THE 1 X 2 1/2 VENTILATION OPENING (SEE FIG.9)

Fig. 5. Suggested chassis layout as viewed from the top.

Construction Details

If the parts listed are used, the chassis layout diagram, *Fig. 5,* can be followed to locate the position of each part on the chassis. The location of the parts on the back of the chassis and location of the two crystal sockets on the left side are not shown, except in the photographs, since their position does not have to be exact. It is recommended that a *Johnson* chassis (Part No. 195-351) be used. This chassis is a bit difficult to obtain, but is much more rigid than the standard 7″ x 7″ x 2″ aluminum chassis.

Completely punch and drill the chassis (except for front side, see below) as shown in *Fig. 5.* The hole size for the tube sockets will depend upon the particular sockets used. The crystal sockets are mounted from the inside of the chassis with 4/40 screws threaded into the chassis wall. This leaves a flush surface for the cabinet to pass over. Similar treatment is given *So1* and *So2,* the coaxial connectors on the right side of the chassis.

The front panel should be made next, following *Fig. 4.* It can be made from a piece of hard aluminum stock, or cut, along with the sub-chassis, from a larger aluminum panel bought for the purpose. (*Par-Metal* No. #6677 unpainted 5¼″ rack panel.) Lay out and drill all holes in the front panel except the seven lower ones. Center punch these only. Using a vise, clamp the panel in position on the front of the chassis. Make sure that there is a ⅛″ overhang on the sides and bottom as shown in *Fig. 4.* This will insure a good fit for the cabinet. Drill the holes for *R3* and *C3* and mount these controls. With these controls holding the panel and chassis together, drill the other five holes through both panel and chassis, following the center punch locations previously made on the front panel. The chassis and panel may now be separated and all burrs cleaned off. If desired, the panel may be either cleaned with steel wool and etched in a lye solution, painted with a crackle finish or sanded and lacquered. Sanding with a horizontal grain on a belt sander and a coat of plastic spray or lacquer gives a very pleasing finish.

Additional Components

Tube Sockets—two mica filled octal, two mica-filled 7-pin miniature with 2¼" shields, one mica-filled 9-pin miniature with 2" shield

Chassis—7x7x2" aluminum, E. F. Johnson 195-351, recommended for rigidity

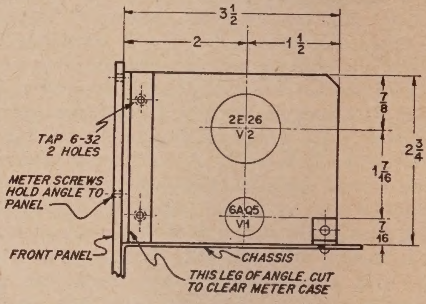
Sub-chassis—made from ⅛" 24ST aluminum stock, 3½"x2¾". See Fig. 6

Front panel—made from ⅛" 24ST aluminum stock, 7¼"x5. See Fig. 4 and text

Cabinet—made from inside aluminum covers of TU-5B surplus tuning unit. Can be made from ½" hard aluminum stock. Be sure to drill plenty of ventilation holes.

Miscellaneous—Supply of 6/32 and 4/40 screws and nuts. Eight ¼" bar knobs (two of these may be red for use on the band switches). One National TPB feed-thru bushing (to connect final tank coil to loading condenser C3). Two 5-lug terminal strips, Birnbach 1388 or similar.

The sub-chassis, *Fig. 6,* is made of the same material as the panel to give the transmitter rigidity. As with the meter hole in the front panel, either a hole saw can be used to cut the socket holes, or a series of small holes may be drilled and then filed smooth. The tubes are placed a bit farther forward in the drawing than in the photographs in order to make it easier to change the r-f tubes without moving the final tank coil. Either two small angles or one long angle can be used to fasten the sub-chassis to the front panel. In either case, the meter mounting screws are used to hold the angles to the panel. If the single angle is used, the leg that fastens to the panel will have to be cut away to clear the meter body. A five-lug terminal strip is mounted vertically on the back of the sub-chassis near the front edge to support the components connected to sockets of *V1* and *V2.* The sub-chassis should be completely wired, leaving six-inch external leads, before it is permanently installed. Care should be taken to leave clearance for the oscillator plate tuning condenser, *C1.* The back corner of the sub-chassis is fastened to the chassis with a small angle as shown in *Fig. 6.*



NOTES - VIEW FROM TUBE SIDE.
MADE OF PIECE OF HARD ALUMINUM, 31/2 X 2 3/4 X 1/8.
1/2X1/2 ANGLES MAY BE BENT FROM 1/2 HARD ALUMINUM STOCK OR TAKEN FROM SURPLUS TU-5 SERIES TUNING UNITS, IF AVAILABLE.
SUB CHASSIS SHOULD BE WIRED BEFORE INSTALLATION.

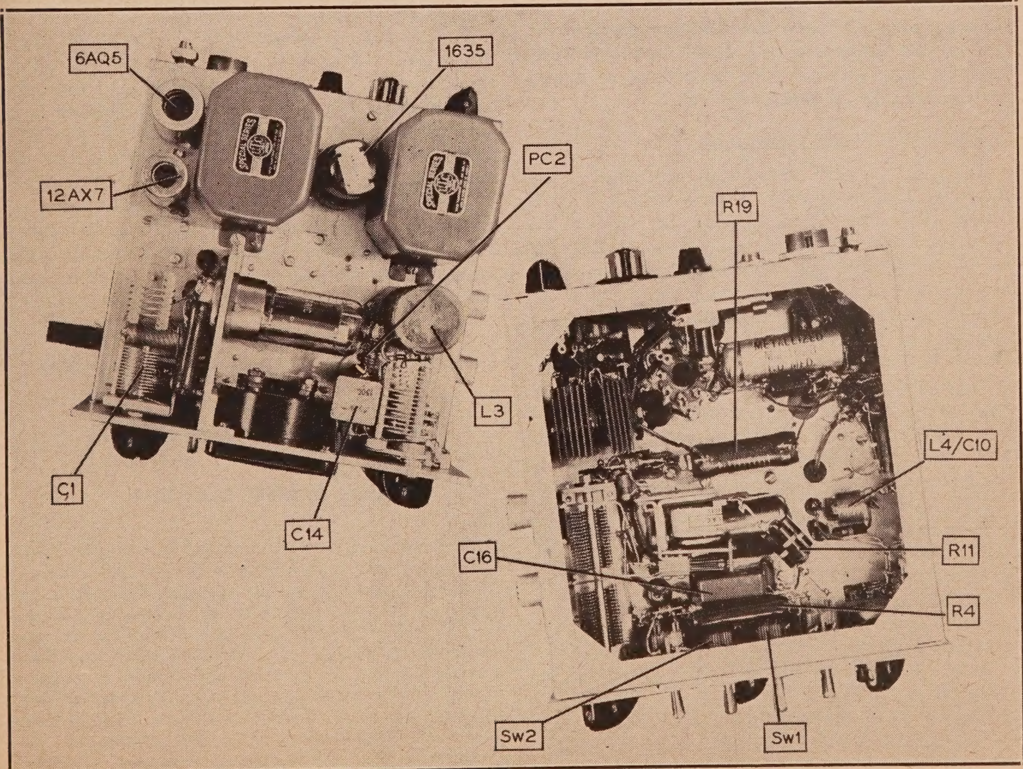
Fig. 6. Sub-chassis layout view.

The 100-ma. meter shunts, *Sh1* and *Sh2,* should now be made. If a *Triplett* 227-T meter is used, a 34-inch piece of No. 30 (formvar insulated) magnet wire scramble wound on any high value 1-watt resistor will work fine. For other meters the correct length of wire will have to be found by cut and try methods using a dry cell, low resistance potentiometer and a test milliammeter in series.

Mount the panel on the chassis using, the seven lower controls to secure it. Mount the wired sub-chassis and meter using the two left hand meter screws to secure the sub-chassis. Mount the rest of the components, sockets, transformers, etc. on the chassis. For convenience in wiring, the fuse holder, antenna relay, selenium rectifiers and final plate by-pass, *C16,* may be left until most of the wiring is done. The choke, *RFC1,* is mounted on a thin piece of bakelite or lucite, directly over the $\frac{9}{16}$" hole near the meter in the front of the chassis, so that the plate supply lead can be fastened to it from below the chassis. The *National* TPB feed through bushing is placed in the ¼" hole just in front of the location of *L3.* The bottom end of *L3* is connected to this bushing. Beneath the chassis this bushing is connected to the two stators of *C3,* the arm of *Sw7* and the antenna relay. Before the driver transformer, *T1,* is installed, its leads should be connected, since there is no large opening beneath this transformer.

Wire the filament and cathode circuits first, then the control circuits and the grid and plate circuits. Dress all this wiring on the crystal side of the chassis in order to leave the other side clear for the r-f wiring. Mount condensers *C6* to *9* around *Sw7* and run a single No. 16 bus back to *C3.* Be sure to insulate the selenium rectifiers from the chassis.

Examination of the bottom view of the chassis photo will be of help in placing the parts under the chassis. With the front (panel) edge of the chassis at the bottom we see first the four switches. It is essential that the two center ones, *Sw1* and *Sw2,* be the *H & H* laminated type with the lugs coming out one end (the top in this case) so that they may fit. Even so, the lugs will have to be bent aside and the center lamination broken off to clear the body of *Sw8.* Mounted directly behind and between these two switches we see *R4.* It is connected between the center lugs of *Sw3* and *Sw4.* Directly behind this resistor, the plate by-pass condenser, *C16,* is installed with the right end going to ground and the left to the bottom of the plate choke, *RFC1.* Behind this condenser we see the antenna relay mounted over the ventilation opening. The group of resistors to the right of the relay and fastened between it and *Sw3,* the spotting switch, is *R11,* the relay coil voltage dropping resistor. This resistor is shorted out when the transmtter is operated with a.c. on the filaments. In this case the "spotting" switch was a double-pole unit, and one half was used to break the control circuit so the transmitter could not be placed on the air when the crystal frequency was being spotted. This is an unnecessary refinement and is not shown in the schematic. To the right of the resistor group, *R11,* can be seen the oscillator cathode tuned circuit, *L4* and *C10.* In the center of the chassis is *R19,* the audio plate voltage drop-



ping resistor. Directly to the left of it is the r-f voltmeter circuit and behind that are the selenium rectifiers mounted on a bakelite block secured to the chassis wall.

Adjustment and Operation

It will be necessary to set *C4* and *C5* so that the 75- and 40-meter bands are properly covered by the final tank circuit. The preliminary setting can be done best with a grid dipper, if one is available. The final setting can be done on the bench with a 200- to 300-volt power supply, a dummy load (a group of carbon resistors to make 50 ohms) and crystals that will hit the center of 75 and 40 meters. If *C2* does not give a plate dip near the center of its range on these crystals, the padders, *C4* and *C5*, should be adjusted until it does.

Attach the microphone and advance the gain control until normal speech kicks the meter up to about 60 ma., when it is set to read modulator cathode current. In actual operation in the car, with 500 volts on the plate, an 80 ma. reading on voice peaks is plenty of modulation. If a chest mike is used, it is best to use a shielded cord and to ground the body of the mike to the shield to avoid possible r-f feedback. With 500 volts on the plate the final grid current should be set between 2.0 to 2.5 ma. and the final cathode current should be between 60 and 70 ma. When tuning up on 75 and 40 meters, always have the coarse antenna loading control, *Sw7*, set for maximum capacity. After the plate circuit is dipped, *Sw7* may be switched to lower capacities until the approximate loading desired is attained. Final loading adjustment is made with *C3*. The plate must be dipped to resonance at all times.

Miscellaneous

The case for the transmitter was made using the inner aluminum covers from a surplus TU-6B tuning unit. The lower third of the back is left open for the controls and connections at the rear of the transmitter. An aluminum block is fastened at the inside front edge on either side to take the two mounting screws seen in the photographs. A clearance of ¼" is left for these blocks when the chassis is laid out. The case is fastened permanently under the edge of the dashboard, and only these two screws and the plugs attached to the transmitter need to be loosened to remove the unit. Slots are cut in each side of the case to allow the passage of the antenna connectors and crystal.

As a further refinement, very useful at night, a 3-volt "grain of wheat" bulb is mounted out of sight, inside the meter, above the face. The bulb is connected in the filament circuit with 30 ohms in series. To fit in the meter, the base must be removed from the bulb. A soldering iron does the trick very nicely.

In many cars, the PE-103A dynamotor can be mounted easily under the hood, especially if the unnecessary base is removed. The 1950 Ford, owned by the author, has an excellent place just below the right-hand hood hinge. An uninitiated person has to hunt to find the dynamotor, even when he has been told that it is under the hood.

While this article is primarily about the transmitter unit itself, it seemed proper, in the interest of clarity, to include references to the external power and control circuits. The schematic diagram, *Fig. 1,* gives the complete circuit as it is installed in the car.

While the author is at present stationed in Greenland, and this transmitter was built there, the previous model, an exact copy except for the use of plug-in coils, was used for a year in the author's car, during which time over 15,000 miles were driven. This included a trip to Forth Worth, Texas, from Washington, D. C. On this trip the first model of the 75-meter SSB mobile transmitter was also used with the following results: It was possible in the early morning under ideal band conditions to maintain a daily schedule with Washington using the 30-watt AM transmitter on 75 meters. The greatest distances worked with this transmitter were from Baton Rouge, La. and St. Louis, Mo. to Washington. The 75-meter SSB transmitter was used on a daily evening schedule to Washington when band conditions were crowded and definitely not favorable. During the entire two-week period, only one SSB schedule was missed. The greatest distance worked with the SSB unit was from Fort Worth, Texas to Washington, D. C. A center-loaded, 9-foot whip was used at all times.

This report is included here to point out that for serious mobile work on 75 meters, SSB is the answer unless you want to change your car into a transmitter. For mobile work on the higher frequency bands, a transmitter similar to the one described here offers greater flexibility and ease of operation.

One solution would be to have both types o transmitters, constructed so as to be interchangeable, until someone comes up with an all-band mobile single-sideband transmitter of suitable proportions to be mounted in an automobile.

Present and Prophetic:

The WIMU Hamfest

The combined W.I.M.U. and C.A.R.S. Hamfest will take place this year during Saturday and Sunday, August 8th and 9th, at Big Springs, Idaho, 20 miles south of the West entrance to Yellowstone Park. Cabins, camp grounds and commercial power are available, to provide comfort along with your fun. The registration fee is $1.00 per licensee or family. Make your reservations for cabins early at Big Springs, Mac's Inn, Andrew's Cottages or Island Park Lodge The Mobile frequency is 3935. For further details, write W7OOY, Secretary, Harlowton, Montana.

Using Your 12-volt Dynamotor

DALE L. HILEMAN, W0MCB

c/o Collins Radio Company, Cedar Rapids, Iowa

There is still a lot to be said for the relatively low cost mobile installation that uses a surplus 12-volt dynamotor. But what about the fellow who doesn't have a '53 model with the 12-volt electrical system. No problem at all, says W0MCB in the article below—Editor.

Many of us have 12-volt dynamotors kicking around in the junk box that we'd like to use with a mobile rig, but alas, the car has a six-volt system. One common solution to this problem involves using a d.p.d.t. relay operated by the push-to-talk switch. When the relay is energized, it connects the automobile battery in series with an extra battery located in the trunk compartment and delivers 12 volts to the dynamotor. When the relay releases, it connects the two batteries in parallel so that the extra battery receives a charge from the generator when the rig is not operating.

The big objection to this system, however, is that unless the extra battery is disconnected when the car is stopped, the car battery will discharge into the extra battery if it has a greater charge. A s.p.s.t. switch in series with the extra battery could be used to disconnect the two batteries when the motor is not running, but it's too easy to forget to throw the switch off every time the car is stopped.

Automatic Disconnect

The author's power supply (see *Fig. 1* on pg. 93) uses a parallel/series switching system, but has an additional relay (*Ry2*) which disconnects the extra battery from parallel arrangement when the car is stopped. The coil of *Ry2* is energized by voltage from the car generator. When the engine is stopped, the generator is not delivering output; therefore *Ry2* will not operate to connect the two batteries in parallel until the motor resumes running.

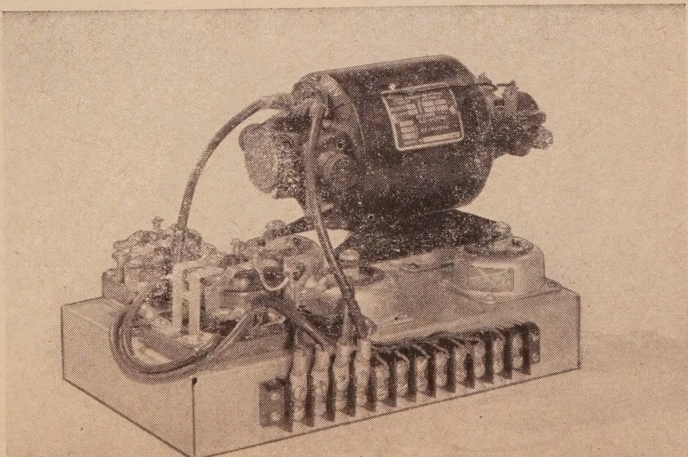
When a heavy load is placed on the automobile battery (lights, heater, etc.) and it's important to get all the charge into the car battery, the charging circuit to the extra battery can be broken if *S1* is operated to *OFF* to open *Ry2*. The *EMERGENCY* position of *S2* is provided so that *Ry2* can be energized to switch the extra battery into the car system when the car is stopped. In this position, *S1* applies battery current to *Ry2* through the generator armature. If the motor is started with the batteries in parallel, *Ry2* will open when the motor has started, because generator output voltage will then be about equal to the battery voltage. This latter feature has no particular advantage except that it makes wiring somewhat simpler, in that the circuit to the generator output post doesn't have to go to the switch.

Lamp, *L1*, is lighted any time *Ry2* is energized to remind the operator not to go away and leave his batteries in parallel. Also, it reminds him not to start the car with the batteries in parallel; if the relay contacts are not heavy, starting current passing through the contacts may damage them.

Construction

Relay, *Ry1*, should be heavy enough to handle about half the car's normal charging current, and *Ry2* must be heavy enough to handle the dynamotor starting current. In the author's power supply both relays are *Potter and Brumfield* PR-series heavy-duty power relays. The dynamotor was salvaged from a Mark II tank transmitter-receiver, and is rated at 12 volts and 10 amps input. The relays handle the dynamotor with no trouble at all. If a

(Continued on page 92)



This is the author's mobile power supply. The dynamotor and relays are mounted on the top of a 7x11x2 inch chassis. High voltage hash filtering components can be located underneath the chassis.

The OTTAWA Six Meter Story

GEORGE A. DAVIS, VE3BBW

78 Holland Ave., Ottawa 3, Ontario, Canada

The Editor of this magazine would be the last one to deny that he is prejudiced when one speaks of 6 meters—but not, I feel, without good reason. 50 megacycles is unquestionably the best band for CD work, be it judged on the basis of "security," ground-wave propagation characteristics, receiver sensitivity, or what have you. In this article we are able to review some of the equipment in use for CD work in Ottawa —how does it stack up against the equipment your community is using?—Editor.

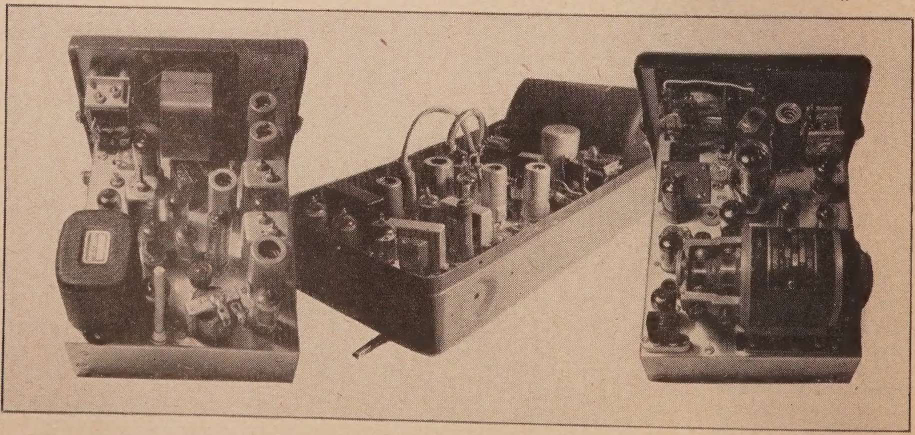
Two major requirements for the 6-meter mobile transmitter are adequate drive and modulation. The low plate voltages usually available place a real challenge before the amateur-designer in order to satisfy these two essentials. Circuits and the normal construction methods which perform excellently at 3.8 Mc. with 30-watt power units are usually unable to deliver usable output at 50 Mc. and higher. Similarly, the complications of producing a sensitive receiver or converter-receiver combination tend to make the amateur dubious about taking on 6-meter mobile operations. However, the gain of a truly resonant antenna permits satisfying results to be obtained with low power output.

In this article three six-meter mobile packages are dealt with, each package comprising transmitter, receiver and modulator. In obtaining adequate drive, the choice of the oscillator tube and its circuit are of prime importance. A multiplication factor of three in the harmonic oscillator is permissible, provided effective transfer of r.f. to the succeeding multiplier stage is ensured. As is well known, an oscillator-tripler rarely delivers sufficient excitation to the following multiplier stage unless a voltage of 250 to 300 is provided. The circuits herein described have been proven with 150-200 volt supplies and whichever may be chosen, satisfactory operation can be expected. Now for a few more specific remarks about these circuits.

A Unitized Equipment

The circuits of this equipment are shown in *Figs. 1, 2* and *3*. The transmitter uses the familiar modified Pierce crystal oscillator-tripler with a 6AK6 pentode and an 8.4-Mc crystal. This version has the "hot screen," feedback being obtained by using the interelectrode capacities of the 6AK6, and output varied by adjustment of screen voltage. The *RFC* consists of one pie of a 2.5 mh. choke. This is satisfactory for 8-Mc crystals or those of higher frequency. This oscillator will oscillate at the fundamental crystal frequency without plate voltage, and isolation from the output circuit is good. The output circuit is tuned to 25 Mc., the tank coil being tapped to provide a better match to the grid of the doubler. The doubler stage is conventional, using a 6AG5, and tunes to 50 Mc. The 6AG5 was selected because of its high transconductance and low drive requirements at low voltages. Adjustment of

Shown in the photograph below are the three 50-Mc transceivers described in this article. At the left is mobile unit #2, in the center is mobile unit #1 and at the right is unit #3.



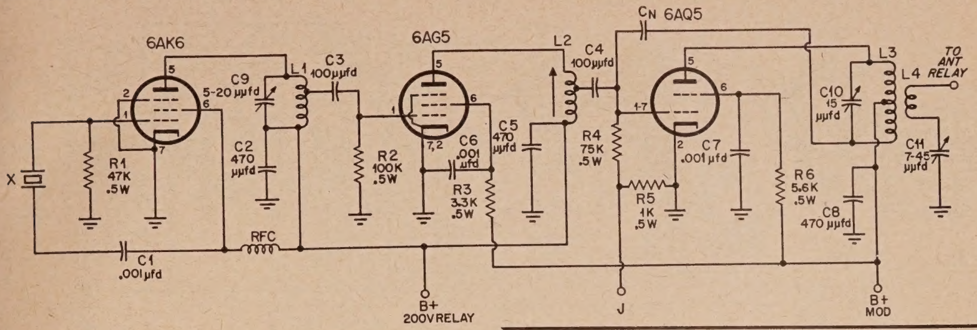

6AK6
6AG5
CN 6AQ5
X
R1 47K .5W
C9 5-20 µµfd
L1
C3 100µµfd
C2 470 µµfd
RFC
C1 .001µfd
R2 100K .5W
C6 .001 µfd
R3 3.3K .5W
C5 470 µµfd
L2
C4 100µµfd
R4 75K .5W
R5 1K .5W
C7 .001µfd
R6 5.6K .5W
C10 15 µµfd
C8 470 µµfd
L3
L4
TO ANT RELAY
C11 7-45 µµfd
B+ 200V RELAY
J
B+ MOD

Fig. 1. Mobile unit #1 transmitter schematic.

the grid resistor and selection of the grid tap for optimum doubling efficiency will pay dividends at the grid of the final in producing increased grid current. The final amplifier, using a 6AQ5, is neutralized by using as a condenser, two pieces of solid hook-up wire twisted together. These are clipped off until neutralization is complete. One metering point is provided for both exciter and neutralization. This is the final grid. The output tank coil is of the balanced type to allow for neutralization. The antenna link is placed at its center and within its coil form. A series variable ceramic capacitor is used to tune out line reactance, being adjusted by a field strength meter to give maximum output. A power output of 2 watts with a 200-volt power supply can be expected.

Coil Winding Data

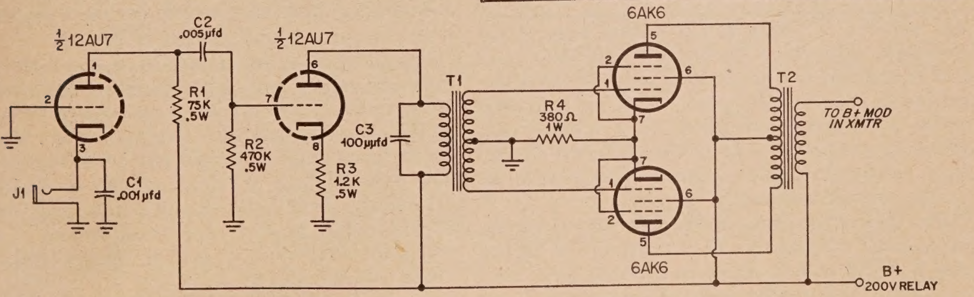
(Figure 1)

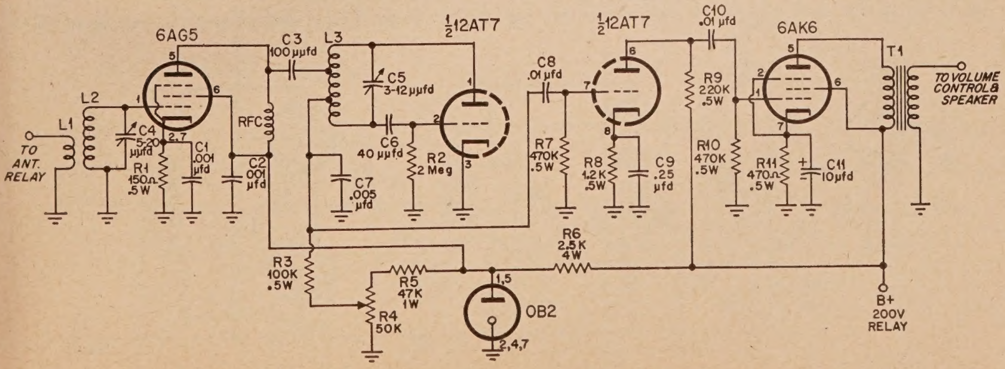
L1—8 turns #22 enam. close wound on ½" dia. form tapped 2 turns down from plate end.
L2—5 turns #22 enam. spaced wire diameter on ½" slug-tuned form tapped 1 turn down from plate end.
L3—6½ turns #22 enam. spaced wire dia. on ¾" poly form (National PRF-2), center tapped.
L4—2½ turns solid insulated hookup wire, wound ⅜" in dia., inserted into center of L3 form and cemented into place.

(Figure 3)

L1—3 turns solid hookup wire wound over L2.
L2—7 turns #23 enam. close wound on ⅜" poly rod.
L3—10 turns #16 solid air wound, ½" dia., 1" long. Coupling tap 4 turns from grid end; B+ tap 4 turns from plate end.

The bottom schematic shows the receiver used in mobile unit #1 (Fig. 3), while the schematic above it is the modulator (Fig. 2). (For transformer data, see page 95)


½12AU7
C2 .005µfd
½12AU7
J1
C1 .001µfd
R1 75K .5W
R2 470K .5W
R3 1.2K .5W
C3 100µµfd
T1
R4 380Ω 1W
6AK6
6AK6
T2
TO B+ MOD IN XMTR
B+ 200V RELAY


6AG5
L1
L2
TO ANT. RELAY
C4 5-20 µµfd
R1 150Ω .5W
C1 .001 µfd
RFC
C2 .001 µfd
C3 100µµfd
L3
C5 3-12µµfd
C6 40µµfd
C7 .005 µfd
R2 2 Meg
½12AT7
½12AT7
C8 .01µfd
R7 470K .5W
R8 1.2K .5W
C9 .25 µfd
C10 .01µfd
R9 220K .5W
R10 470K .5W
6AK6
R11 470Ω .5W
C11 10µfd
T1
TO VOLUME CONTROL & SPEAKER
R3 100K .5W
R4 50K
R5 47K 1W
OB2
R6 2.5K 4W
B+ 200V RELAY

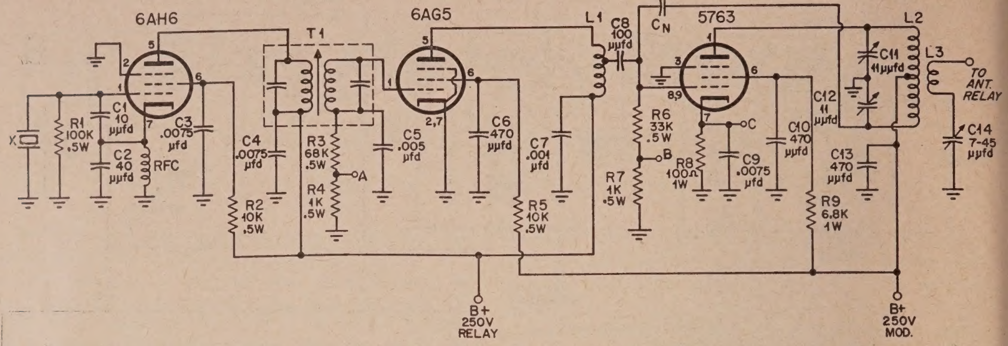

6AH6
6AG5
5763
T1
L1
L2
L3
X
R1 100K .5W
C1 10 µµfd
C2 40 µµfd
RFC
C3 .0075 µfd
C4 .0075 µfd
R2 10K .5W
R3 68K .5W
R4 1K .5W
A
C5 .005 µfd
C6 470 µµfd
C7 .001 µfd
R5 10K .5W
C8 100 µµfd
CN
R6 33K .5W
B
R7 1K .5W
R8 100Ω 1W
C
C9 .0075 µfd
C10 470 µµfd
C12 11 µµfd
C11 11µµfd
C13 470 µµfd
R9 6.8K 1W
C14 7-45 µµfd
TO ANT. RELAY
B+ 250V RELAY
B+ 250V MOD.
5
2
1
7
6
2,7
3
8,9

Fig. 4. Transmitter schematic of mobile unit #2. (For transformer data, see page 95)

Modulation is applied to both plate and screen of the final and to the doubler screen. This arrangement ensures that the r.f., which normally gets through to the output tank by direct coupling, is partially modulated, resulting in increased modulation capability. The modulator is a conventional class AB but uses a grounded-grid pre-amplifier for matching a single button carbon microphone without a microphone transformer. No gain control is required, and modulation depth is varied by raising or lowering the voice. With the constants given, a telephone microphone in a handset will give full modulation when speaking slightly louder than normal—a natural tendency when operating on the average highway.

Coil Winding Data

(Figure 4)

L1—5 turns #23 enam. close wound on 3/8" slug-tuned form (National XR-50) tapped 1½ turns from plate end.

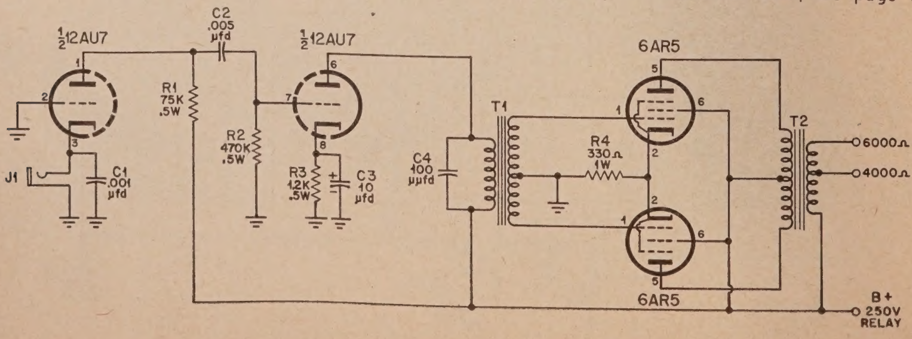
L2—10 turns #23 enam. spaced wire diameter on 3/4" poly form (National PRF-2) center tapped and spaced at center to allow L3 to be wound on form.

L3—2 turns #18 solid rubber insulated hookup wire wound on L2 form at center.

The receiver is a tried and proven unit consisting of a 6AG5 r.f., 12AT7 detector and first audio, and a 6AK6 output. It gives adequate gain, sensitivity, and selectivity for net operation in the Ottawa Area. The r-f stage provides some gain, freedom from antenna effects, and isolation of the super-regenerative detector—the latter being a "must" for net operation, so as to avoid heterodynes from radiating receivers. The number of operating dials is reduced, and regeneration control preadjusted by using voltage regulation of the r-f amplifier plate and screen, and also of the detector. Best adjustment of the detector for optimum performance is achieved by selection of the B+ tap on *L3* and the value of capacitor *C7*. The values of grid leak and blocking condenser shown on *Fig. 3* have been found to be standard for a number of variations. Both audio stages are run wide open, and volume is controlled by the 100-ohm potentiometer across the secondary of the output transformer in the control unit. Send-receive is effected by a d.p.d.t. relay, which transfers the B supply and antenna from the receiver to the transmitter when the press-to-talk button is pressed.

Remote control by means of a five-conductor cable and simple control box permits trunk mounting of the unit, and provides a minimum of controls at the operating position. The form factor shown in the photograph was inspired by an article in May 1950 *QST*, by W3JUM, wherein he discussed a two-meter mobile, with each portion complete in itself, to allow bench testing and alignment of any individual unit. This is ideal for signal fixed frequency operation.

Fig. 5. Modulator used with the transmitter at the top of this page. (For transformer data, see page 95)


½12AU7
½12AU7
6AR5
6AR5
C2 .005 µfd
R1 75K .5W
R2 470K .5W
R3 1.2K .5W
C3 10 µfd
C1 .001 µfd
J1
C4 100 µµfd
T1
T2
R4 330Ω 1W
6000Ω
4000Ω
B+ 250V RELAY
1
2
3
6
7
8
5
6
2
1

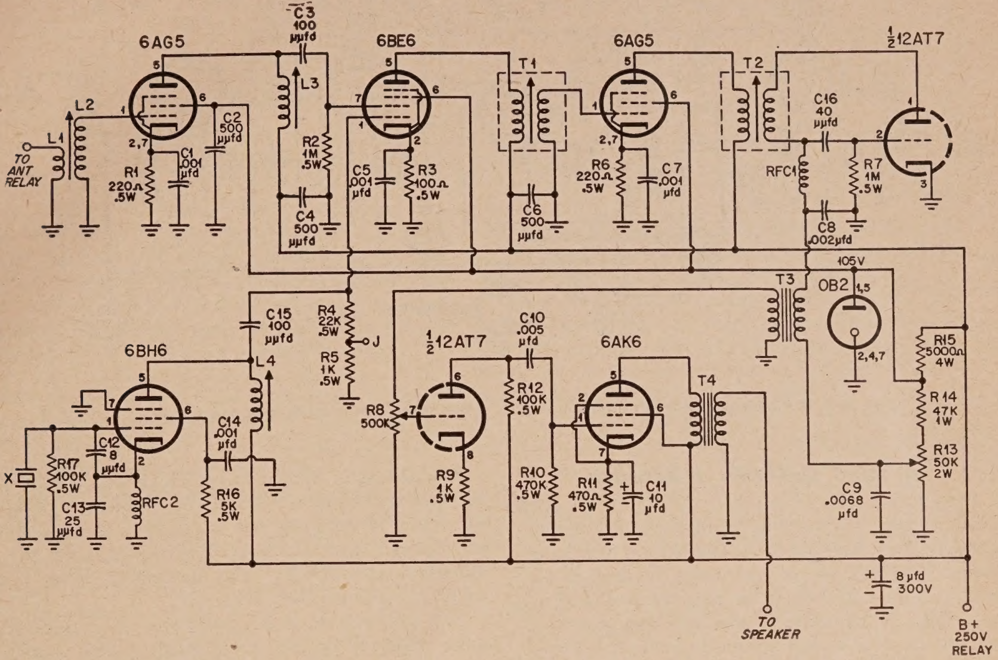

6AG5
C3 100 μμfd
6BE6
T1
6AG5
T2
½12AT7
L2
L1
TO ANT RELAY
2,7
R1 220Ω .5W
C1 .001 μfd
C2 500 μμfd
L3
R2 1M .5W
C4 500 μμfd
C5 .001 μfd
R3 100Ω .5W
C6 500 μμfd
R6 220Ω .5W
C7 .001 μfd
C16 40 μμfd
RFC1
R7 1M .5W
C8 .002μfd
105V
T3
OB2
2,4,7
R15 5000Ω 4W
R14 47K 1W
R13 50K 2W
C9 .0068 μfd
C15 100 μμfd
R4 22K .5W
J
R5 1K .5W
6BH6
L4
½12AT7
R8 500K
C10 .005 μfd
R12 100K .5W
6AK6
T4
X
R17 100K .5W
C12 8 μμfd
C13 25 μμfd
RFC2
C14 .001 μfd
R16 5K .5W
R9 1K .5W
R10 470K .5W
R11 470Ω .5W
C11 10 μfd
8 μfd 300V
TO SPEAKER
B+ 250V RELAY

Fig. 6. Receiver used in mobile unit #2.
(For transformer data, see page 95)

Coil Winding Data

(Figure 6)

L1—2 turns solid hookup wire wound over L2

L2, L3—9 turns #23 enam. close wound on Millen 69041 form.

L4—7½ turns #23 enam. spaced to fill National XR-50 form.

Fig. 7. The all-triode mobile unit #3 transmitter.
(For transformer data, see page 95)

Coil Winding Data

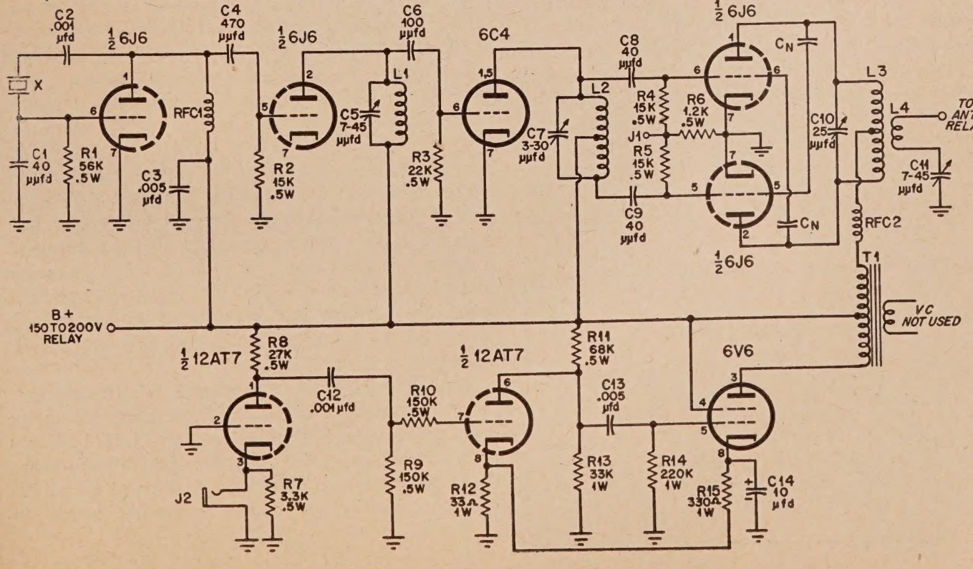
(Figure 7)

L1—11 turns #23 enam. spaced wire diameter on ½" form.

L2—13 turns #22 solid tinned wire spaced 1⅝" on ⅜" solid poly rod, center tapped (see text).

L3—9 turns #20 enam. spaced wire diameter on ¾" poly form (National PRF-2).

L4—3 turns solid insulated hookup wire, ⅜" dia., inserted into center of L3 form and cemented in place.


C2 .001 μfd
½6J6
C4 470 μμfd
½6J6
C6 100 μμfd
6C4
½6J6
C8 40 μμfd
CN
L3
L4
TO ANT. RELAY
X
RFC1
L1
C5 7-45 μμfd
L2
C7 3-30 μμfd
R4 15K .5W
R6 1.2K .5W
J1
R5 15K .5W
C9 40 μμfd
C10 25 μμfd
C11 7-45 μμfd
C1 40 μμfd
R1 56K .5W
C3 .005 μfd
R2 15K .5W
R3 22K .5W
CN
RFC2
½6J6
T1
VC NOT USED
B+ 150 TO 200V RELAY
R8 27K .5W
½12AT7
C12 .001μfd
½12AT7
R11 68K .5W
6V6
R10 150K .5W
C13 .005 μfd
J2
R7 3.3K .5W
R9 150K .5W
R12 33Ω 1W
R13 33K 1W
R14 220K 1W
R15 330Ω 1W
C14 10 μfd

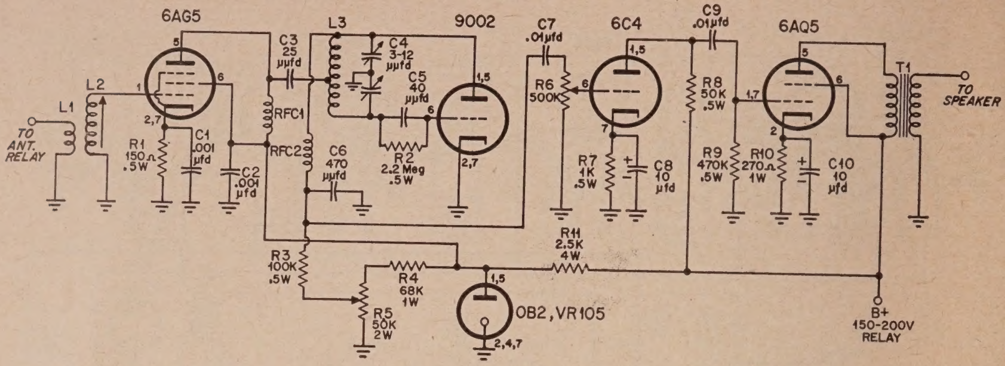


Fig. 8. Receiver used in mobile unit #3. (For transformer data, see page 95)

A More Elaborate Installation

Our second unit (*Figs. 4, 5* and *6*) differs from No. 1 in that the transmitter, receiver and modulator have been assembled on one chassis and so designed for local control and under-the-dash mounting. It differs further in the receiver employed and the choice of transmitter tubes and components, although the transmitter circuit is somewhat similar.

The transmitter uses a 6AH6 in a "hot cathode" modified Pierce oscillator-tripler with 8400 kc. crystals. This circuit is easier to get operating due to the control of feedback being accomplished by adjusting the ratio of capacitors *C1* and *C2*. The output circuit tuned to 25 Mc. employs a 25 Mc. TV i-f transformer. It has been found that this results in very efficient transfer of power to the succeeding doubler stage, as both output and input are tuned to the same frequency and a good impedance match is obtained. The 6AG5 doubler is conventional and the 5763 final delivers 3½ watts to the antenna. This tube is easy to drive and delivers reasonable output at good efficiency. Although neutralization of this tube is not normally required, it was used here due to the close proximity of input and output circuits. A split output tank is employed, tuned by an 11µµfd. per section miniature butterfly capacitor. Metering is done in the doubler grid, final grid and final cathode. As noted in the photograph, the transmitter takes up the left-hand side of chassis. The neutralizing capacitor is a short length of 72-ohm twin lead.

Coil Winding Data

(Figure 8)

L1—2 turns solid insulated hookup wire wound over ground end of L2.

L2—9 turns #23 enam. close wound on National XR-50 slug-tuned form.

L3—9 turns #20 enam. spaced wire diameter on ¾" poly form (National PRF-2) tapped 4 turns from grid end.

Modulation is applied to both plate and screen of the final and to the screen of the doubler. Modulator input is designed for a single button carbon microphone with a 12AU7 grounded grid preamplifier and driver. The modulator tubes are 6AR5's, operated class AB.

The receiver in this transceiver is considered quite elaborate by mobile standards in this locality where selectivity requirements are not too great and simple super-regenerative sets suffice. It is a superhet with a super-regenerative second detector and a crystal controlled local oscillator, voltage regulation, and fixed tuned circuits for single preset frequency operation. It consists of a 6AG5 r-f stage which is tuned by the brass slug in the coil form and the input capacity of the tube and wiring, which is followed by a 6BE6 pentagrid mixer. With separate excitation, improved mixer performance can be obtained by interchanging the signal and oscillator grids of this tube, especially if oscillator output is low. However, the oscillator shown develops the necessary 11 volts of excitation at the normal oscillator grid of the 6BE6, and the mixer was operated in a conventional manner. The oscillator is a 6BH6 with a 7973-kc crystal in modified Pierce "hot cathode" circuit, with output on approximately 40 Mc. The oscillator is tuned for maximum output by adjusting the iron slug in the output tank coil and reading oscillator grid current at the metering point. Five hundred microamps through 22,000 ohms is optimum. The i-f amplifier frequency is approximately 10.6 Mc. for operation on 50.4 Mc. and is a single stage employing a 6AG5 tube. No attempt has been made to incorporate a.v.c. and the r-f, mixer and i-f stages are cathode biased.

The secondary of the second i-f transformer feeds into one half of a 12AT7 operating as a self-quenched super-regenerative detector. Initial adjustment of this stage for optimum results took some time, as the choice of quench frequency was a bit critical. The given circuit constants result in

(*Continued on page 74)*

A Mobile Calibrator

WILFRED M. SCHERER, W2AEF

Contributing Editor, CQ

The number of mobile stations that are being "cited" for out-of-the-band operation is on the increase. Frequency stability is not the proper answer, according to the book. A secondary standard for mobile use can be easily adapted from existing equipment—it is the correct solution.—Editor.

FCC regulations require that each amateur station be equipped with accurate measuring apparatus, independent of the radio transmitter, to insure operation of the transmitter within the legal limits of the amateur bands. Amateur mobile stations are not exempt from this rule, and with the increasing popularity of mobile v.f.o.'s, independent checking equipment is becoming a must. Everyone needs protection to maintain operation within the bands, especially when such operation may occur near the band-edges. Even some crystals, ground for a frequency near the edge of a band, do not insure operation within the band. Their frequency can be shifted with different types of circuits, or with variations in tuning, as well as by the extreme differences in temperature likely to be encountered in mobile use.

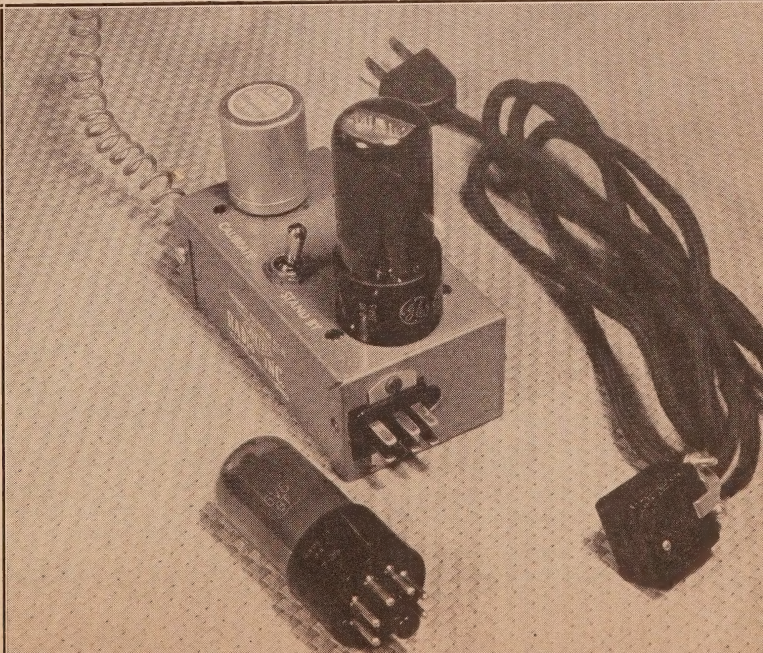
A popular method of checking the frequency of a fixed station is the utilization of a secondary frequency standard which provides an accurate harmonic check point at every 100 kc. Since the device is a simple affair, and since its employment is not complicated, it may easily be used for mobile work.

Many amateurs use home-made secondary frequency standards, the circuits of which may be found in many of the radio handbooks, while other amateurs use any one of the several commercially manufactured models now available.

The *Bud Frequency Calibrator #FCC-90* is an excellent unit for adaptation to mobile use. This is a self-powered device intended for use off the 117-volt a-c line, but it may be readily adapted for 6-volt d-c mobile operation, without impairing its usefulness as an a-c operated unit for home station use.

The circuit diagram of the model *FCC-90* is shown in *Fig. 1.* A 50L6 is used, with its heater potential supplied from the a-c line through a resistor type line cord, and its plate potential derived from a small selenium rectifier.

The diagram for the modified unit is shown in *Fig. 2.* For a-c operation, the 50L6 is inserted in the tube socket, and the resistor line cord is hooked up, by means of a *Jones* plug, with connections as shown in the diagram. For mobile use, a 6V6, 6F6, or 6L6 is substituted for the 50L6, and a different cable from the d-c source is used with the appropriate connections shown in the



To modify the FCC-90 the a-c cord has been disconnected and fitted with a Jones plug. In the mobile a separate power cable from the receiver supplies the necessary voltages. The 50L6 is used in the home QTH, and a 6V6 in the mobile.

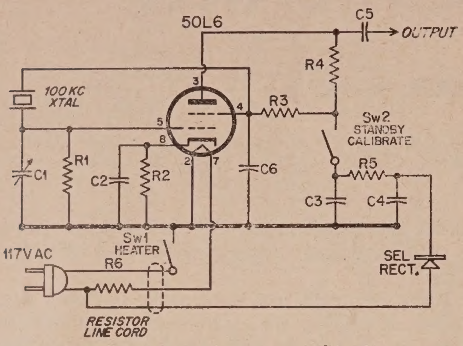

50L6
C5
OUTPUT
R4
100 KC XTAL
3
4
R3
5
8
Sw2 STANDBY CALIBRATE
R1
C1
C2
R2
2
7
C6
R5
C3
C4
117V AC
Sw1 HEATER
R6
SEL. RECT.
RESISTOR LINE CORD

Fig. 1. Wiring schematic of the BUD FCC-90 Calibrator.

diagram. The modified unit may now be used either for fixed station use in the home, or for mobile operation in the car.

Modifying Procedure

First remove the three leads of the a-c line cord by unsoldering their connections. Be careful not to cut or break the lead with the woven spiral resistance wire. Bend the leads on the 20-20 μfd. electrolytic capacitor, *C3-C4,* so that it may be shoved out of the way without disconnecting it from the circuit. This is necessary in order to cut a hole in the side of the chassis for the *Jones* receptacle, as indicated in *Fig. 3.* After this hole has been made, install the receptacle with its even numbered terminals next to the tube socket. The lugs of the tube socket *terminals 5* and *6* will have to be bent down so they will not hit the grounded bracket of the receptacle.

Connect receptacle *terminal 2* to the side of the heater switch where the white lead of the line cord was formerly connected. Connect receptacle *terminal 4* to crystal socket *terminal 5,* which is already connected to the negative side of the rectifier and to which the black lead of the line cord was formerly connected. Connect receptacle *terminal 6* to the tube socket *terminal 7,* to which the resistor leg of the line cord was formerly connected.

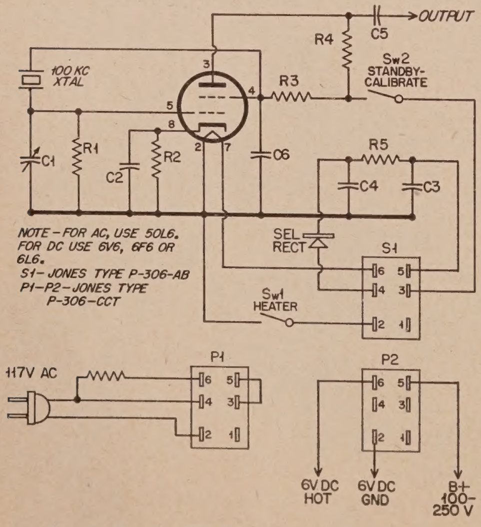

OUTPUT
C5
R4
100 KC XTAL
3
R3
Sw2 STANDBY-CALIBRATE
4
5
8
R1
C1
C2
R2
2
7
C6
R5
C4
C3
NOTE - FOR AC, USE 50L6. FOR DC USE 6V6, 6F6 OR 6L6.
S1 - JONES TYPE P-306-AB
P1-P2 - JONES TYPE P-306-CCT
SEL. RECT
S1
6
5
4
3
2
1
Sw1 HEATER
P1
117V AC
P2
6V DC HOT
6V DC GND
B+ 100-250 V

Fig. 2. The modified circuit showing the two new extension cords with Jones plug fittings.

Unsolder the 22,000-ohm filter resistor, *R5,* and the positive lead of the 20-μfd. electrolytic section, *C3,* from the "calibrate-standby" switch, *Sw-2,* terminal along the outside edge of the chassis. Now connect this switch terminal to *terminal 3* on the receptacle. Bend back the filter resistor, *R5,* so that it is vertical along the inside edge of the receptacle. and solder it, together with the unconnected lead of *C3,* to receptacle *terminal 5.* Then bend the capacitor back into place and put on the chassis base cover.

Connect the a-c resistor line cord to the *Jones* plug *P2,* as indicated in *Fig. 2.* Also make up a new power cable for. d-c use, and connect it to *P1,* as indicated in the same diagram.

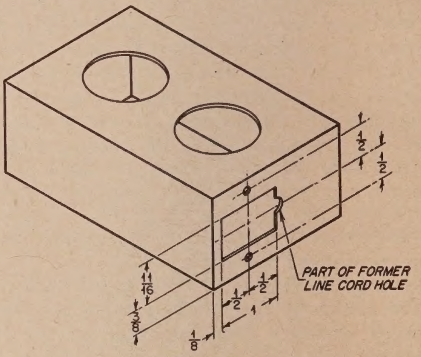

1/2
1/2
11/16
3/8
1/2
1/2
1/8
PART OF FORMER LINE CORD HOLE

Fig. 3. The hole for the Jones socket is cut out according to the drawing shown above.

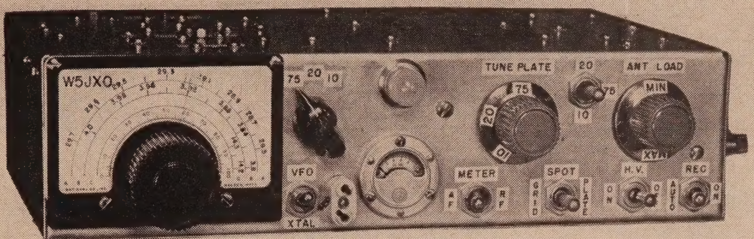
For d-c use, 6 volts is required for the heater, and any potential between 100 and 250 volts may be used for plate power. This may be obtained from the receiver power supply without any strain, since the plate current amounts to less than 2 ma. Any of the three tubes, specified earlier for d-c use, may be used, but the 6V6 is preferable because it consumes the least heater power.

If you are lucky enough to be located where it is possible to receive a broadcast station on a frequency which is a multiple of 100 kc., you will be able to calibrate, or adjust, the 100-kc crystal frequency by means of the trimmer provided for the purpose—beating it against the carrier of the broadcast station. In other cases it will be necessary to adjust the crystal at a location where it is possible to tune in WWV for the standard. This may be done at home before you leave for a tour of mobile operation.

When using a converter or receiver of good

(Continued on page 80)

A VFO Mobile Transmitter



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Part I of Two Parts

The transmitter described below is a simple and easily duplicated multi-band mobile unit. It contains a number of novel features that have attracted considerable interest. It also won first prize at the 1952 New Mexico State Hamfest.—Editor

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This story will not solve all your mobile problems, but it may give you an idea or two. The rig pictured has been jounced around for a year over roads better suited to mountain goats than automobiles, and its operation has been eminently satisfactory in all respects.

Some of its features are: (1), thirty watts input on 10, 20, and 75 meters; (2), bandswitched operation; (3), VFO or crystal frequency control; (4), Pi-network output circuit for convenience and efficiency in antenna loading and TVI reduction; (5), high efficiency class B audio system; (6), circuitry for increasing the average modulation level and maintaining a narrow transmitted bandwidth; (7), all important r.f. and a.f. circuits metered; (8), unobtrusive under-the-dash mounting; (9), provision for operating entire installation, including receiver and converter, from an a.c. power supply; (10), complete push-to-talk operation, and all controls available from the operating position; (11), provision for "spotting" VFO; (12), transmitter and modulator mounting arranged in order to facilitate rapid removal from car for easy conversion to fixed station use, or for servicing; (13), happy XYL (nothing in the trunk and no knee-banging up front).

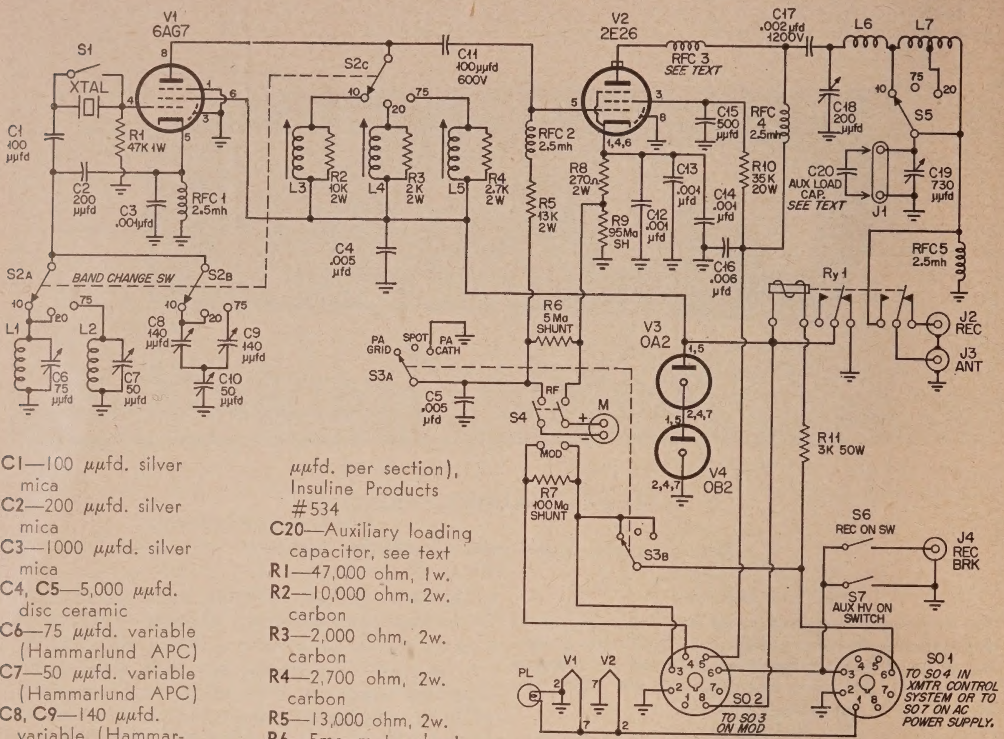
The R. F. Unit

Only two tubes are used in the r.f. portion of the transmitter circuit. A 6AG7, connected in a conventional electron-coupled Colpitts VFO circuit, serves also as the crystal oscillator when *S1* (*Fig. 1*) is open. The crystal acts as a series control element when the VFO main tuning capacitor, *C10,* is tuned to minimum capacity. Some crystals may oscillate more readily if the VFO dial is set near the crystal frequency.

For 75-meter operation, the v-f-o grid tank tunes from 3.8 to 4.0 Mc., and full bandspread may be achieved by adjusting *C7* for 4.0 Mc. with *C10* at minimum capacity, and then adjusting *C9* for 3.8 Mc. with *C10* at maximum capacity. The adjustment of *C9* and *C7* interact to some extent so the settings should be checked several times on the final calibration.

The VFO operates from 7.1 to 7.425 Mc. for coverage of the 20 and 10-meter bands. Almost full scale bandspread is obtained on 10 meters, but 20 meters occupies only a portion of the dial, due to the harmonic relationship between 10 and 20 meters. A *Hammarlund* type *MC-50-S* variable capacitor was used for *C10,* because it was on hand. Its semicircular plate shape results in some crowding of the low frequency end of the VFO dial. A type *MC-50-M* midline style capacitor, as specified in the parts list, will alleviate this condition and improve the bandspread proportionately on 20 meters over that shown in the front panel photograph.

Adjust *C6* for 7.425 Mc. with *C10* at minimum capacity and then adjust *C8* for 7.1 Mc. with *C10* at maximum capacity. Perform the same juggling act here as described earlier, to take care of the interaction between adjustments of *C6* and *C8.* Calibrate the v-f-o scales from 28.5 to 29.7 Mc., and 14.2 to 14.3 Mc. for the two bands.


V1 6AG7
S1
XTAL
C1 100 μμfd
R1 47K 1W
C2 200 μμfd
C3 .001μfd
RFC 1 2.5mh
S2c
C11 100μμfd 600V
L3
R2 10K 2W
L4
R3 2K 2W
L5
R4 2.7K 2W
C4 .005 μfd
S2A
BAND CHANGE SW
S2B
L1
L2
C6 75 μμfd
C7 50 μμfd
C8 140 μμfd
C9 140 μμfd
C10 50 μμfd
V2 2E26
RFC 3 SEE TEXT
C17 .002μfd 1200V
L6
L7
RFC 2 2.5mh
C15 500 μμfd
RFC 4 2.5mh
C18 200 μμfd
S5
C20 AUX LOAD CAP. SEE TEXT
J1
C19 730 μμfd
R8 270Ω 2W
R5 13K 2W
R9 95Ma SH
C12 .001 μfd
C13 .001 μfd
C14 .001 μfd
R10 35K 20W
C16 .006 μfd
RFC5 2.5mh
Ry 1
J2 REC
J3 ANT
R6 5Ma SHUNT
V3 OA2
V4 OB2
PA GRID
SPOT
PA CATH
S3A
C5 .005 μfd
RF
M
S4
MOD
R7 100Ma SHUNT
S3B
R11 3K 50W
S6 REC ON SW
J4 REC BRK
S7 AUX HV ON SWITCH
PL
V1
V2
SO 2
TO SO 3 ON MOD
SO 1
TO SO 4 IN XMTR CONTROL SYSTEM OR TO SO 7 ON AC POWER SUPPLY.

C1—100 μμfd. silver mica
C2—200 μμfd. silver mica
C3—1000 μμfd. silver mica
C4, C5—5,000 μμfd. disc ceramic
C6—75 μμfd. variable (Hammarlund APC)
C7—50 μμfd. variable (Hammarlund APC)
C8, C9—140 μμfd. variable (Hammarlund APC)
C10—50 μμfd. variable (Hammarlund MC-50-M)
C11—100 μμfd. 600v. mica
C12, C13, C14—1,000 μμfd. disc ceramic
C15—500 μμfd. disc ceramic
C16—6,000 μμfd. 1200v. mica
C17—2,000 μμfd. 1200v. mica
C18—200 μμfd. variable Hammarlund MC-200-M)
C19—730 μμfd. variable (both sections in parallel of 2-gang TRF midget broadcast variable, 365 μμfd. per section), Insuline Products #534
C20—Auxiliary loading capacitor, see text
R1—47,000 ohm, 1w.
R2—10,000 ohm, 2w. carbon
R3—2,000 ohm, 2w. carbon
R4—2,700 ohm, 2w. carbon
R5—13,000 ohm, 2w.
R6—5ma. meter shunt
R7—100ma. meter shunt
R8—270 ohm, 2w.
R9—95ma. meter shunt
R10—35,000 ohm, 20w.
R11—3,000 ohm, 50w.
RFC1, RFC2, RFC5—2.5mh. choke (National R-100)
RFC3—Parasitic choke, see text
RFC4—2.5mh. choke (National R-100S)
Xtal—75-or 40-meter crystals
M—0-1ma. midget meter, 1" mounting hole, see text.
RY1—117v. a-c relay, 445 ohm d-c resistance, d.p.d.t. (Allied Control Type BO)
S1, S6, S7—toggle switch, s.p.s.t.
S2—Single deck ceramic switch, 3 circuits, 3 positions (Centralab Type 174C)
S3—toggle, d.p.d.t., center "off" position
S4—toggle, d.p.d.t.
S5—toggle, s.p.d.t., center "off"
J1—terminal strip (National type FWH)
J2, J3, J4—(Cinch No. 81F)
SO1, SO2—Octal socket

Fig. 1. Wiring schematic and parts list of the r-f unit.

Coil Winding Data
(Fig. 1)

L1—7¼ turns, B&W Miniductor #3015.
L2—21 turns, B&W Miniductor #3015.
L3—8 turns, #26 enamel on CTC LS5 iron slug-tuned form (white slug.)
L4—26 turns #26 enamel on CTC LS5 iron slug-tuned form (red slug.)
L5—CTC LS3 5-Mc coil.
L6—8 turns, B&W miniductor #3014.
L7—26 turns, B&W miniductor #3015, tapped at 6½ turns.

As observed in *Fig. 3,* the v-f-o grid coils, *L1* and *L2,* are mounted at right angles to each other immediately to the rear of the main tuning capacitor, *C10,* and the band-change switch, *S2.* Each v-f-o coil is rigidly mounted between two pieces of polystyrene. Cut the pieces so that they are a little larger than the coil diameter, and so the coil will be supported midway between the top and bottom of the chassis. When pruning the coils initially to the specifications given in the coil data, arrange to leave about ¼" of the plastic strips exposed on each end of the coils. Drill four holes about ⅛" deep in each piece of polystyrene, spacing the holes to fit the plastic strips on the coil ends. Drill and tap 6/32 holes for mounting the coil assembly to the chassis, and for mounting the solder-lug coil terminations. Cement each assembly together with poly cement and the result is an exceptionally rigid coil mounting.

The v-f-o tuning capacitor, *C10,* is base-mounted

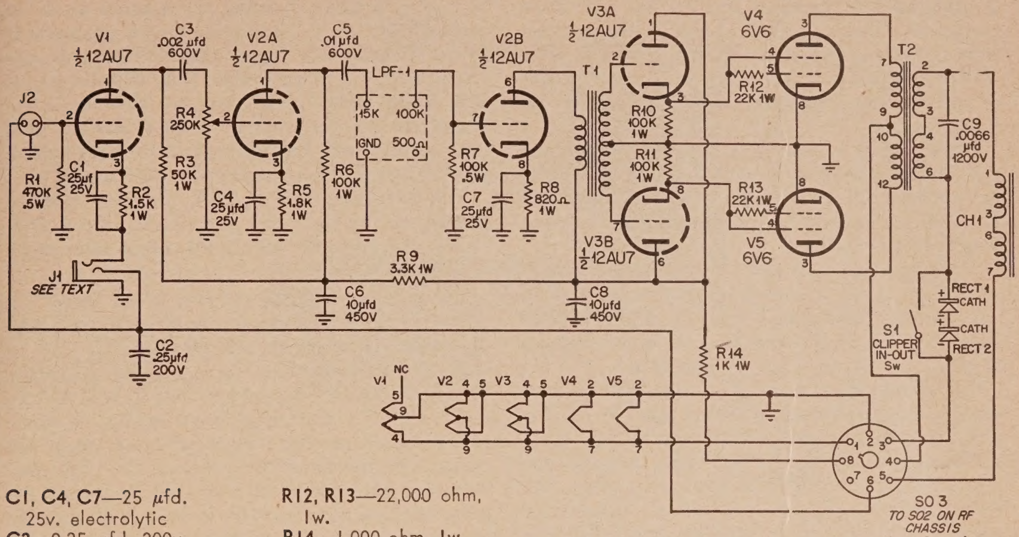

V1
½12AU7
C3
.002 µfd
600V
V2A
½12AU7
C5
.01 µfd
600V
LPF-1
15K
100K
GND
500Ω
V2B
½12AU7
V3A
½12AU7
T1
V4
6V6
T2
J2
R1
470K
.5W
C1
25µf
25V
R2
1.5K
1W
R4
250K
R3
50K
1W
C4
25µfd
25V
R5
1.8K
1W
R6
100K
1W
R7
100K
.5W
C7
25µfd
25V
R8
820Ω
1W
R10
100K
1W
R11
100K
1W
R12
22K 1W
R13
22K 1W
V3B
½12AU7
V5
6V6
C9
.0066
µfd
1200V
CH1
RECT 1
CATH
RECT 2
S1
CLIPPER
IN-OUT
Sw
R14
1K 1W
J1
SEE TEXT
R9
3.3K 1W
C6
10µfd
450V
C8
10µfd
450V
C2
.25µfd
200V
NC
V1 V2 V3 V4 V5
SO 3
TO SO2 ON RF
CHASSIS

Fig. 2. Wiring schematic and parts list for the modulator. Note the use of a low-pass filter.

C1, C4, C7—25 µfd. 25v. electrolytic
C2—0.25 µfd. 200v. paper
C3—0.002 µfd. 600v. paper
C5—0.01 µfd. 600v. paper
C6, C8—10 µfd. 450v. electrolytic (both units in one can)
C9—0.0066 µfd. 1200v. mica
R1—470,000 ohm, ½w.
R2—1,500 ohm, 1w.
R3—50,000 ohms, 1w. (low noise type)
R4—250,000 ohm potentiometer
R5—1,800 ohm, 1w.
R6, R10, R11—100,000 ohm, 1w.
R7—100,000 ohm, ½w.
R8—820 ohm, 1w.
R9—3,300 ohm, 1w.
R12, R13—22,000 ohm, 1w.
R14—1,000 ohm, 1w.
T1—Interstage transformer, 1:3 ratio, (Chi. Tran. IN-14)
T2—Multimatch modulation transformer, (U.T.C. CVM-O)
CH1—0.85h, Thordarson splatter choke T20C62
LPF1—Low pass filter, (Chi. Tran. LPF-1)
Rect. 1, Rect. 2—100 ma. selenium rectifier
J1—Three-way microphone jack
J2—Two-contact microphone connector
V1, V2, V3—12AU7
V4, V5—6V6 (or 7C5 with socket change)

to the chassis, using brass spacers to align the shaft and the dial coupling.

Heavy bus wire should be used in the v-f-o grid circuit wiring to reduce vibration effects. Trimmers *C6, C7, C8,* and *C9* are mounted so their adjusting slots are accessible from the top of the chassis, as seen from *Fig. 4.* This photograph also shows the numerous ventilating holes located in strategic areas for cooling the r.f. tubes and the dropping resistor, *R11.*

The oscillator plate circuit works straight through for 75 meters, tuned by coil *L5.* The 6AG7 doubles frequency in its output circuit for 20 meters, and *L4* is peaked at about 14.25 Mc. The oscillator quadruples for 10-meter grid drive to the 2E26, and *L3* is peaked at 29.1 Mc. Resistors *R2, R3,* and *R4* act to reduce the loaded 2E26 grid current to 2.5 ma. on each band. They also broadband the response so that substantially constant excitation is available over the various bands.

The three slug-tuned coils are mounted side by side vertically on a small brass bracket near the v-f-o 7.0-Mc grid coil. The open side of the bracket faces the tube sockets to allow direct wiring and shielding from the v-f-o coils.

The 12″ x 7″ x 3″ zinc-plated chassis is divided into two approximately equal compartments by a partition formed from sheet brass. A right-angle bend is formed along the sides and ends of the bracket for securing to the chassis and bottom cover plate. A cut-out is made in the front portion of the partition for meter and pilot lamp clearance. The two VR tubes are mounted, one above the other, at the extreme rear of the partition with the tubes projecting into the oscillator compartment. The 6AG7 and 2E26 tubes are mounted side by side on the opposite side of the partition, with *Ry1* immediately underneath the 6AG7. The 6AG7 socket should be oriented so that *pins 2 and 7* of the tube are in a vertical plane.

Capacitor *C16* and choke *RFC4* are mounted to the rear of the 2E26. The plate tuning capacitor, *C18,* is mounted to the rear of the chassis by using the regular threaded front bearing. The front rotor shaft is sawed off flush with the threaded bearing. An extension shaft and coupling is fastened to the rear rotor shaft of the variable capacitor, for front panel control.

The antenna loading capacitor, *C19,* is a midget two-gang t-r-f broadcast type. Both sections connected in parallel give sufficient output capacity for 14 and 28-Mc operation over a rather wide range of feed line impedances. Operation at 4 Mc. into a 50-ohm line, or lower, will require additional capacity of the order of 0.001 to 0.0015 µfd. to unload the final amplifier sufficiently. Jack *J1* is provided for this purpose, mounted on the right end of the chassis near the front panel. The extra mica capacitor, *C20,* is soldered across the terminals of a *Millen* plug and tied to the jack with a short length of cord, so the capacitor is always handy for use when needed.

Choke *RFC5* is merely a safety device in case *C17* breaks down and puts the d-c high voltage on the antenna. If this should occur, the choke will short the high voltage to ground and trip the power system circuit breaker.

The pi-network tank coils, *L6* and *L7,* are mounted at right angles to each other at the rear of *C19.* The 20-meter inductance is made up of the 10-meter coil, *L6,* plus 6½ turns of *L7.* All of *L7* plus *L6* is in the circuit for 75-meter operation.

The bottom cover plate, *Fig. 4,* is provided with three holes for adjustment of the slugs in *L3, L4,* and *L5.* A large square cut-out, covered by copper screen soldered to the cut-out edges, provides the necessary air circulation through the fifteen ⅝" holes punched in the top of the chassis immediately over the bottom plate cut-out. The bottom plate is secured to the chassis by 6/32 screws with the nuts soldered to the underneath sides of the chassis lips.

The VR tube dropping resistor, *R11,* is made up of two 1500-ohm, 25-watt, resistors in series, to fit the available space just behind the power sockets.

Most of the wiring from the power sockets is run to the front panel switches and oscillator compartment by forming it into a cable placed in the lower right corner and along the bottom front of the chassis.

The Modulator Unit

Audio punch is vital to a low-powered mobile rig and it is easily obtained. The circuit shown in *Fig. 2* is completely bug free and has been carefully designed for maximum effectiveness.

Ample gain is available for using either crystal or high-impedance dynamic microphones at *J2,* or carbon mikes at *J1.* A shorting plug is necessary at *J1* to complete the input tube cathode-to-ground circuit when *J2* is being used. Note that the unused half of the input 12AU7 does not have its heater connected into the circuit. A *6C4* may be used here equally well, but we wanted to carry only a 12AU7 and a 6V6 as modulator tube spares.

The low pass filter, *LPF-1,* provides optimum attenuation of the voice frequencies above 3000 cycles, and gives the high level output filter much less work to do.

The push-pull cathode follower driver stage, *V3,* provides sufficient driving power, with excellent regulation, to drive the class-B 6V6's to over 20 watts of sine wave output power at the secondary of the modulation transformer. The 15 watt *U.T.C.* type *CVM-O* transformer is not taking too much of a beating since the frequencies below about 400 cycles are attenuated by *C3* and *C5.* The low frequency attenuation is primarily necessary because clipping normally acts to over-emphasize the bass frequencies. The terminal connections shown for *T2* on the modulator schematic match the 17,000-ohm plate-to-plate load from the 6V6's to the 8000-ohm class C final amplifier load.

The 6V6's draw about 70 ma. for 20 watts sine wave output power, and about 15 ma. under resting conditions. The driver and speech amplifier stages, combined, draw another 15 ma. resting current, increasing to about 25 ma. for full output from the driver stage.

Automatic high level negative peak clipping is accomplished by the selenium rectifiers in the low side of the modulation transformer secondary. Switch *S1* shorts out the clipper for occasional tests to satisfy the curiosity of the doubters and to fill an extra hole *ye scribe* drilled in the chassis when he wasn't minding his business. This method

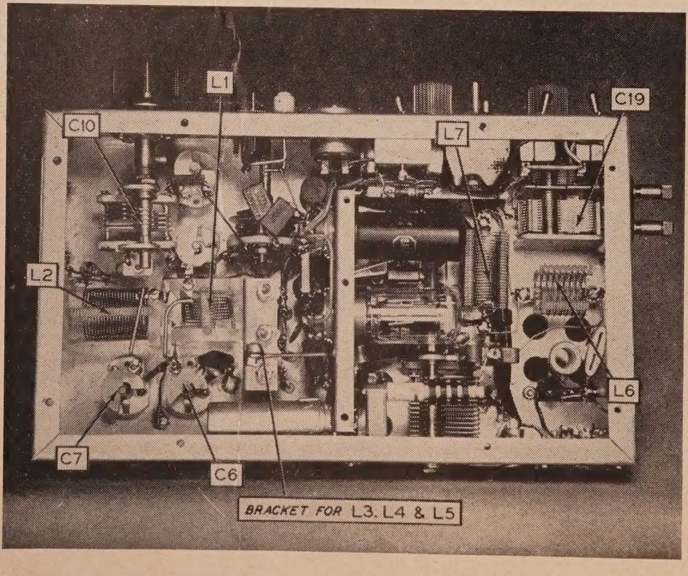


Fig. 3. This view of the r-f unit with the bottom chassis cover plate removed shows the mounting position of some of the major components. The oscillator tuning section is at the left and final amplifier is on the right.

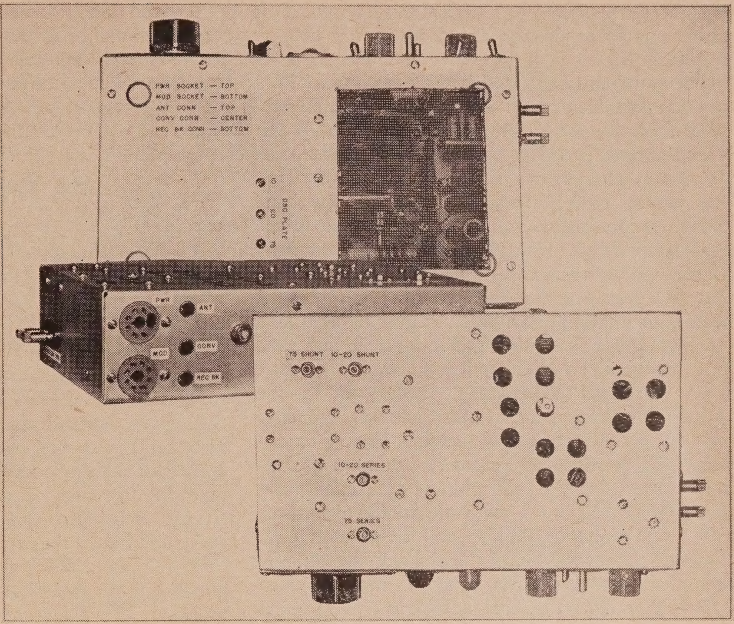


Fig. 4. In this composite view we have (reading from top to bottom) views of bottom, back and top of the r-f unit. Note that the band setting condensers are all screwdriver adjustables.

of clipping is simple and effective for mobile use and requires no adjustments. The high-level splatter filter, formed by *C9, CH-1* (and *C16* in the r.f. chassis), attenuate frequencies above 3500 cycles.

The complete modulator is built on a 7″ x 5″ x 2″ steel chassis, fitted with a bottom cover plate. The method described for mounting the r-f chassis in the car applies to the modulator as well. It can be tucked away under the dashboard or out of the way on the firewall, since the gain control is seldom touched after its initial adjustment. The various photographs indicate the general parts layout. The interstage transformer, *T1,* is mounted underneath the chassis.

Mounting and Switching

Transmitter mounting in the car is accomplished by two right-angle brackets permanently bolted underneath the dash panel. Two holes for 10/32 screws are drilled in each end of the chassis near the top and front, and nuts soldered to the chassis on the inside. The transmitter is placed in position between the brackets, and the 10/32 screws inserted and tightened down. No other supports are necessary.

Front panel illumination for the VFO dial and other controls is achieved by the pilot lamp mounted at the top of the meter. A white plastic cap is used in the *Dialco* holder. The top half of the cap may be covered with black paint to eliminate glare at night.

Switch *S6,* in the "AUTO" position, lets the receiver silencing relay operate automatically whenever the microphone push-to-talk button is pressed or the auxiliary h-v switch, *S7,* is operated. When *S6* is thrown to the receiver "ON" position, the receiver remains operative when the transmitter is placed on the air. This is necessary for VFO zero beating of received signals and occasional monitoring of your own signal.

The "AF" position of the meter switch, *S4,* connects the meter to read the modulator class B plate current, giving a useful check on modulator operation and some indication of the degree of clipping. The "RF" position of *S4* connects the meter through one side of *S3* to indicate various 2E26 currents. In the "GRID" position of *S3,* all voltages are applied and the meter reads the 2E26 loaded grid current. In the "SPOT" position the high voltage is removed from the 2E26 and the modulator to allow zero beating the VFO. In the "PLATE" position, the transmitter is again in full operation, but the meter now reads the 2E26 cathode current. The miniature 0-1 ma. meter used in this transmitter was manufactured by the *MB Manufacturing Company, Inc.,* and was obtained from the *Niagara Radio Supply Corporation,* New York, through an advertisement in *CQ.*

The antenna changeover relay, *Ry1,* has a coil designed for 117-volts a.c. It will operate on the direct current drain of the transmitter when connected in the manner shown in the schematic. This arrangement allows the one relay to serve equally well regardless of whether battery power or the a-c power supply is used. One side of the relay shorts the h-v line to ground on "STANDBY" to prevent oscillator hangover from blocking the receiver for a few seconds while the filter capacitors are discharging.

Tubes of the 2E26 type will usually exhibit a v-h-f parasitic oscillation unless otherwise deliberately suppressed. This particular layout required a choke coil, *RFC3,* consisting of 6 turns of #18 enamel covered wire, about 3/8" diameter. The 2E26 is stable on all bands and neutralization is not required.

The *National* type *R-100* shunt feed choke, *RFC4*, is quite satisfactory on all three bands. Several other types burned up in this application on 28 Mc.

The tune-up procedure is simplicity in itself. Set the meter switch to the "RF" position, set the VFO dial to the desired frequency, and set the band change switch and pi coupler output switch to the appropriate band. Unloaded p-a grid current may be checked by throwing *S3* to the "SPOT" position and operating the h-v switch or pressing the microphone button. The receiver may be used as a monitor or for zero beating purposes at any time by throwing the "REC" switch to the "ON" position. To load the antenna, throw *S3* to the "PLATE" position (the meter actually indicates cathode current) and set the antenna loading capacitor, *C19,* to maximum capacity (minimum loading). Throw on the high voltage and quickly dip the plate current with the plate tuning capacitor, *C18.* Decrease *C19* slightly and redip with *C18.* Continue this process until the desired cathode current of 65 ma. (27 watts input) is reached when *C18* is dipped as the final adjustment. *C18* must always be tuned for dip as the final adjustment to the network.

A good check for determining if the antenna is actually loading up is to hold a large fluorescent lamp tube several feet away from the antenna and turn on the transmitter. If performed after dark, this little stunt will gain you new respect from your neighbors, or at least the comment that they always did know you were a little "gone."

The Control System

The control system is diagrammed in *Fig. 6.* The PE-103A dynamotor was removed from its base and mounted under the car hood. Relay *Ry2* can be the 6-volt starting relay from the PE-103A base, or one of the commercial relays available for this service.

The three circuit breakers from the PE-103A are left on their original mounting bracket, which in turn bolts underneath the auto dashboard. *Bkr1* then gives filament circuit overload protection and also serves as the main filament on-off switch. *Bkr2* and *Bkr3* are normally left closed. An overload in any one of the three breaker-protected circuits will cause the starting relay to drop out and shut down the dynamotor. Components *Pl1, So4, R1,* and *Ry1* mount in a small metal box attached to the right-hand side of the circuit breaker bracket. The filter capacitor, *C1,* mounts on the opposite side of the bracket.

One set of contacts on *Ry1* operate the starting relay, which draws too much current for the push-to-talk microphone switch contacts. The other set

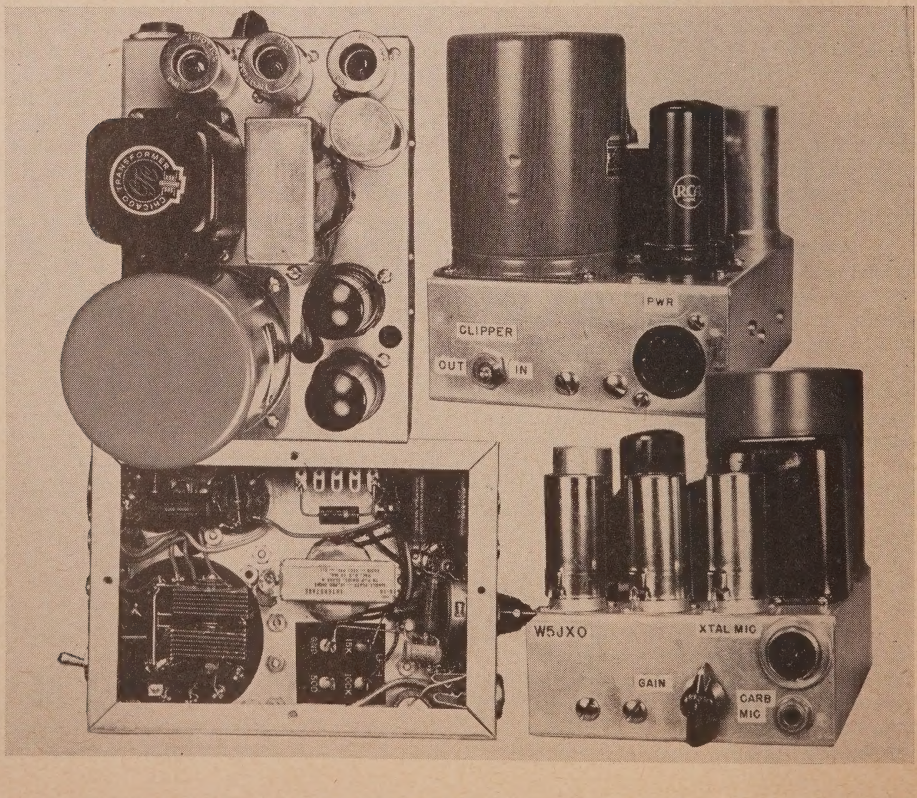
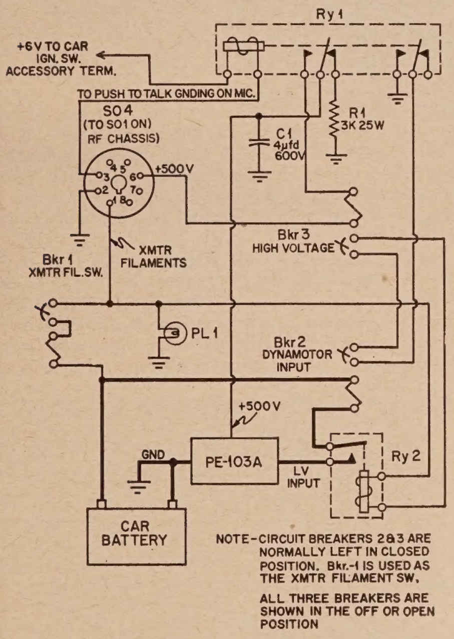


Fig. 5. Top, bottom, rear and front views of the Modulator unit. The chassis measures 7" x 5" x 2".

of relay contacts opens or closes the high voltage line to the transmitter and grounds the line through *R1* on "STANDBY" to get rid of the coast-down voltage output from the dynamotor and the *C1* charge.

The complete installation in a 1951 Studebaker V8 sedan consists of mounting the circuit breaker panel at the extreme left end of the dash panel, between the left body wall and the hood release latch, and flush with the front of the dash panel. The r-f chassis mounts at the right end of the dash underneath the glove compartment, and set flush with the dash panel. The modulator mounts vertically on the firewall just to the left and below the transmitter. The a-c power supply, when used, sets on the floor hump underneath the receiver and converter. The *Gonset* converter bolts directly to the receiver bottom and both are installed or removed as one unit.



Ry1
+6V TO CAR IGN. SW. ACCESSORY TERM.
TO PUSH TO TALK GNDING ON MIC.
SO4 (TO SO1 ON) RF CHASSIS)
C1 4µfd 600V
R1 3K 25W
+500V
Bkr1 XMTR FIL.SW.
XMTR FILAMENTS
Bkr3 HIGH VOLTAGE
PL1
Bkr2 DYNAMOTOR INPUT
+500V
GND
PE-103A
LV INPUT
Ry2
CAR BATTERY

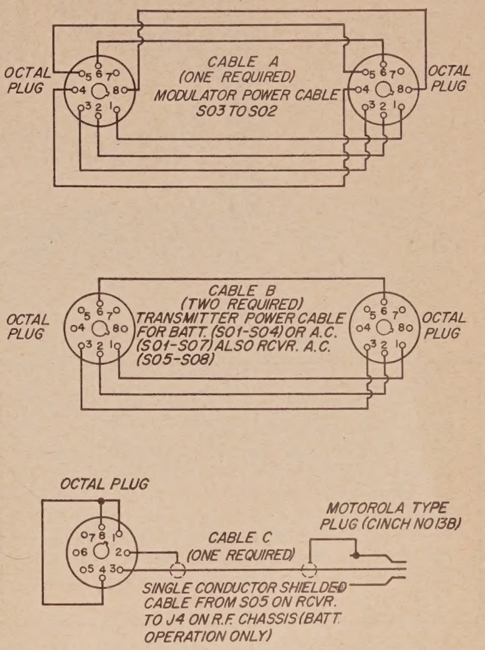
NOTE-CIRCUIT BREAKERS 2&3 ARE NORMALLY LEFT IN CLOSED POSITION. Bkr.-1 IS USED AS THE XMTR FILAMENT SW.

ALL THREE BREAKERS ARE SHOWN IN THE OFF OR OPEN POSITION

C1—4 µfd. 600v. oil
R1—3,000 ohms, 25w.
SO4—octal socket
PL1—6.3v. pilot lamp
RY1—6v. d-c relay, d.p.d.t.
RY2—Dynamotor starting relay (Advance "Gen-E-Motor" Type 951C, or use PE-103A 6v. relay)
Bkr1—7.5 amp. circuit breaker from PE-103A
Bkr2—40 amp. circuit breaker from PE-103A
Bkr3—220 ma. circuit breaker from PE-103A

Fig. 6. Parts list and schematic of the control system.

The various interconnecting cables for both battery and a-c operation are shown schematically in *Fig. 7.* Cable "A", from the r-f chassis to the modulator, is used at all times, and only one is required. Cable "B" is used to connect the r-f chassis to the battery power control system, or to the a-c power supply, as desired. An additional cable "B" is required to connect the receiver to the a-c power supply. Cable "C" is used only to connect the receiver to the r-f chassis for battery operation.



OCTAL PLUG
CABLE A (ONE REQUIRED) MODULATOR POWER CABLE SO3 TO SO2
OCTAL PLUG
OCTAL PLUG
CABLE B (TWO REQUIRED) TRANSMITTER POWER CABLE FOR BATT. (SO1-SO4) OR A.C. (SO1-SO7) ALSO RCVR. A.C. (SO5-SO8)
OCTAL PLUG
OCTAL PLUG
CABLE C (ONE REQUIRED)
MOTOROLA TYPE PLUG (CINCH NO 13B)
SINGLE CONDUCTOR SHIELDED CABLE FROM SO5 ON RCVR. TO J4 ON R.F. CHASSIS (BATT OPERATION ONLY)

Fig. 7. A schematic diagram of the interconnecting cables required for both battery and a-c operation.

Only a moment's time is required to change the station over from battery to a-c operation or *vice versa.*

(Next month W5JXO will describe his receiver modifications and the a-c power supply used with this mobile transmitter.)

A Propagation Note:

Due to a number of circumstances beyond the immediate control of the Editorial Staff, there will be no Propagation department this month. The exacting space requirements of the Special Mobile Issue have limited us to the brief summary below—

The most probable periods for ionospheric storms during May are from 2-3, 13-19, 29-30. A period of good propagation will probably exist during May 5-12.

During May, seasonal ionospheric conditions are such that daytime maximum usable frequencies continue to decrease, and night-time MUF's continue to rise . . . Very little DX can be expected on 10 meters and generally only north-south paths on 15 meters . . . Twenty meters will be the best daytime DX band during May. It will open somewhat earlier than it did during the winter months and remain open considerably longer . . . A seasonal increase in ionospheric absorption and atmospheric noise levels will effect DX possibilities, on 40 and 80 meters.

There is a tendency during May, for an increase in the occurrence of aurora activity and a sharp increase in sporadic E (short skip) propagation.

the Monitoring Post

One of the problems that plague the CQ staff is what to do with "newsy" items about Hams that just don't seem to fit in under one of our department headings. Apparently the answer to this question is the "Monitoring Post"—a department that had been discontinued in 1951. In bringing it back to life we draw attention to our policy of using it for items of general interest. This month, in keeping with the mobile theme, we report on several interesting happenings in that field—Editor.

Most amateurs these days are interested in call-letter license plates for their automobiles. The system worked out, by a committee on the Arctic Amateur Radio Club headed by Bill Cowles, KL7AN, with Mr. M. P. Mullaney, Alaska Territorial Tax Commissioner, for obtaining them, is worth explaining. Mr. Mullaney was willing to authorize the issuance of the plates, if it would not increase the burdens of the overworked Tax Office; therefore he agreed to allow KL7AN to handle the details . . . Bill mailed application blanks to all Alaskan amateurs. When they were returned to him with a deposit, the list of applicants was checked by the FCC to be sure that they all held valid amateur licenses, and the call-letter plates ordered. The first distribution was made in October, 1952 . . . KL7AN, who is already soliciting applications for the 1954 plates, and his committee (calls under the accompanying picture) deserve a vote of thanks for their excellent work. Alaskan amateurs particularly like the fact that their plates are painted with a distinctive, reflective enamel, in contrast to the regular enamel of the conventional license plates.

K6CN reports that his biggest trouble when he operates mobile is the way other mobile operators drive when they see him driving along southern California highways. He wonders if it is his 1929 Buick or the antenna that bothers them. It could hardly be the latter. What's unusual about a whip antenna on an automobile these days? Admittedly, the one K6CN uses is a trifle long—twenty-five feet to be

The men largely responsible for Alaskan amateurs being granted the privilege of call-letter license plates. Left to right, they are: Bill, KL7AN, Chairman, License plate committee; Lt. Bob Brandt, Alaska Highway Patrol; Mr. Roland Livesley, Regional Coordinator, Civilian Defense; Ray Skelton, Chief, Fairbanks City Police Department; Charles, KL7WW, committee member; George, KL7ADR, Committee member; Mr. K. V. Preston, Engineer-in-Charge, FCC, Fairbanks; John, KL7PE, committee member; and Paul, KL7AEP, committee member.

Photo by Jessen's Weekly (Alaska)

K6CN/Mobile, operated by Lt. Col. Leland W. Smith, USMC. In the event you do not recognize the car, it is a 1929 Buick. The transmitter runs about thirty watts input on 4, 14, and 28 Mc. Helping to run up a mileage total on the transmitter equalling the 190,000 miles on the speedometer is a twenty-five-foot whip antenna!

Official U.S. Marine Corps Photo

exact. At any rate, Leland has comparatively little trouble working trans-Pacific DX from the car when parked in a favorable location.

When the *Flying Enterprise II* was anchored in Panama waters recently, Captain "Stay Put" Kurt Carlsen, W2ZXM/Mobile Marine, was honored by being issued the call letters KZ5HC and being made an honorary member of the Canal Zone Amateur Radio Club. In turn, Kurt took members of the club on a personally-conducted tour of the ship. Naturally, the new W2ZXM/MM was of major interest. It is a duplicate of the kilowatt station that went down with the *Flying Enterprise I*, and uses a pair of 4-250A's in the final . . . Kurt refused to accept a penny of the over two million dollars in gifts that were showered on him after his heroic efforts to save the original *Flying Enterprise*. He carries the bills to prove that he paid for every part in the new W2ZXM/MM.

Defense Department Photo (Air Force MATS)

Staff Sergeant Jim Kuykendoll, KH6AFW, Hickam Field, T.H., tuning up his "all-band" mobile transmitter installed in a 1952 Mercury. The transmitter runs about thirty watts to a 2E26, Rothman modulated.

Jim, KH6AFW, uses Rothman screen modulation of the 2E26 final amplifier in his multi-band mobile transmitter. He believes that its weight and space-saving features makes this system of modulation a "natural" for mobile installations . . . An interesting feature of Jim's rig is a "tune-up" switch, which substitutes a conventional dropping resistor between the B+ and the screen-grid terminal of the 2E26 for the modulator to aid in tuning up.

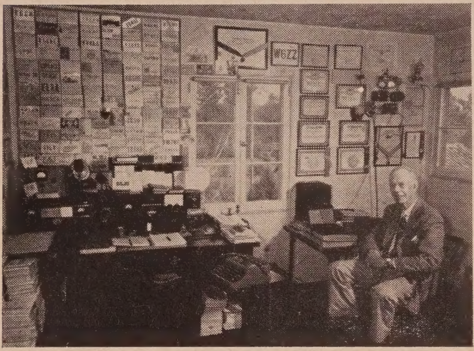
In closing this first copy of the "new" Monitoring Post please keep in mind that this department has been reactivated to put important news about "you" before the many CQ readers. Please feel free to submit items about club activities, contests, Hamfests and publicity on amateur radio events to: Monitoring Post Editor, c/o CQ Magazine, 67 West 44th Street, New York 36, N.Y.

Captain Kurt "Stay Put" Carlsen, W2ZXM/MM, demonstrating his new kilowatt transmitter on the flying Enterprise II to members of the Canal Zone Amateur Radio Club during a recent stop-over in Panamanian waters. If the captain would move his arm, you could see his call letters and a replica of his ship painted on his tie.

DX AND OVERSEAS NEWS

Gathered by DICK SPENCELEY, KV4AA

Box 403, St. Thomas, Virgin Islands, USA.



Old timers as well as newcomers are familiar with the calls of W6ZZ or ex-W1WV operated by Miles Weeks of Menlo Park, Calif. Miles has knocked off 35 Zones and 126 Countries since setting up shop at W6ZZ and is presently very active on 21 Mc.

March comes in like a lion and goes out like a lamb. This truism generally refers to W and VE weather; however, a certain DX contest accented the lion angle as the bands were turned into angry (T9) bee-hives of activity. Conditions were generally fair with 3.5 Mc. doing a QRN-less job this year in comparison with last year's static. 7 Mc. held up fairly well but Europeans were not at their usual strength. 14 Mc. did its stuff during daylight hours while a couple of nice openings appeared on 21 Mc. 27/28 Mc. was very spotty, but stations did appear if you waited long enough. It seemed that short skip DX conditions prevailed on all bands which augured well for high scores from stations within a 2500 mile radius such as KG4AF, KV4AQ, VP9BF, KP4JE, TI2TG and 'you know who.'

We wish to thank the many stations who forwarded comments and suggestions regarding the projected "ABC-Z" awards, which appeared in the February issue. Reaction, in most part, has been favorable to the basic idea as set forth.

We believe we have the makings of an award that will find acceptance with the majority of active Hams and one which we feel will definitely give a better indication of all-around Ham DX ability. There are innumerable small items to be ironed out before this plan becomes a workable one but we hope to have it completed, for your perusal, in the very near future.

At Time of Writing

VS9AS is now active in Salalah, Sultanate of OMAN, and has been heard on 7017 kc. This country, as announced, is now a separate one and is located approximately 600 miles N.E. of Aden at Lat. 54 E. Long. 17 N. . . . Activity in Aden, as reported by VS9AW/G3GUK, is represented by *VS9AD* who runs 5 watts input, xtal, on 14 Mc. Other 'up and coming' Hams include VS9AP and VS9AN who hope to be on the air in the not too distant future.

W2ZU reports that *W6GGR*, Tom Monroe, is presently awaiting his 'YI' prefix in the American Embassy in Baghdad . . . *VP8AW*, John Turnbull, is a new arrival on the South Shetland Islands. John is ex-VS1DY and plans to be very active from VP8AW. He was recently heard on 7017 kc. 0030 GMT . . . *ZD8BE* has been heard on 14040 around 2215 GMT.

HZ1MY has now turned up in CN8 land and will soon be on with CN8MY. Dick plans to operate from Rio de Oro and Ifni and, in this direction, has received some very encouraging news from the Spanish Government. When permission is granted a definite date for his operations there will be given. Dick adds that transportation is no problem as he can easily drive to Rio de Oro from his present QTH . . . *ZD1C* has been active on 7010 kc. around 0115 GMT. QSL's should go via ZD1FB . . . One *ZD8A* put on an appearance on 7022 kc. This could have been ZD7A on his way home but we have no definite dope as yet.

From VK3XO we are advised that *ZC3AA* will commence operations on Christmas Island, Indian

(Continued on page 86)

Very well known to the DX world is John Brown, VP8AP, Falkland Islands. John, also GM3EYP, has done much to hand out needed QSO's from both the South Shetland Islands and Falkland Islands. He leaves for home in May. The adding machine comes in handy to figure out how many are calling him at the same time!

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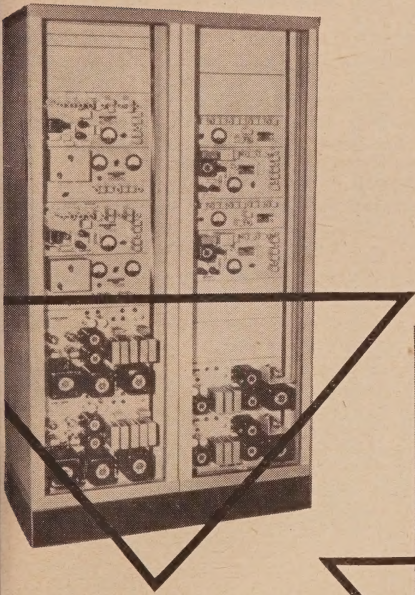

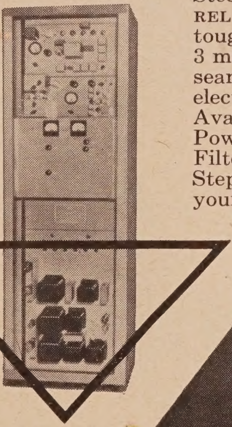

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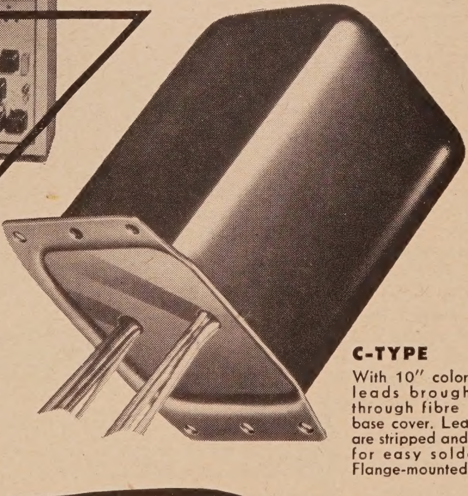
Illustrated at right: REL 900 MC Transmitter, Series 707-757. Illustrated immediately above: REL Model 759 70 MC Dual Transmitters and Receivers. These systems make wide use of CHICAGO C-Type "Sealed-in-Steel" transformer units.



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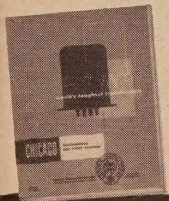

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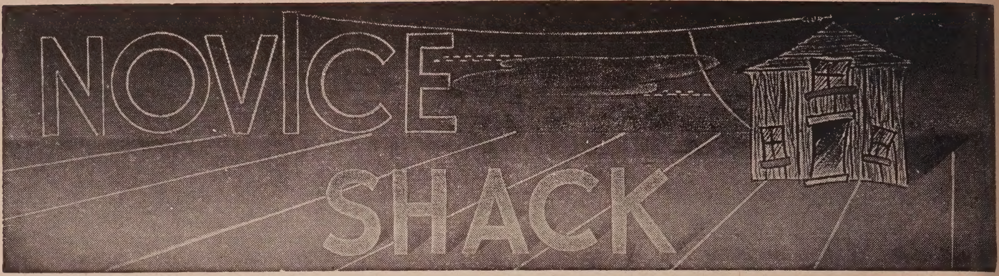

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Conducted by HERB BRIER, W9EGQ

385 Johnson Street, Gary, Ind.

Continuing our review of equipment suitable for Novice use, we are examining this month the *Dixon Model 75* transmitter kit, pictured on this page. Manufactured by the *Dixon Electronics Company,* Detroit, Michigan, it uses a pair of 807's, in parallel, driven by a 6AG7 modified-Pierce crystal oscillator. Rated power input is seventy-five watts on any amateur band, 1.8 to 29.7 Mc., inclusive. The standard kit is supplied with pre-wound coils and a crystal for the band and frequency of the purchaser's choice, with additional coils and crystals available, if desired.

Parallel feed to the 807 plates removes d-c voltages from the exposed amplifier coil and tuning condenser. Two milliammeters measure plate and control-grid current of the 807's.

The power supply is about as simple as it could be, consisting of the power transformer, a 5U4 rectifier tube, and a 16 μfd., 600-volt filter condenser. In spite of its simplicity, the input power of the transmitter is the full rated seventy-five watts, when properly loaded, and the output is a pure crystal tone (T9X.)

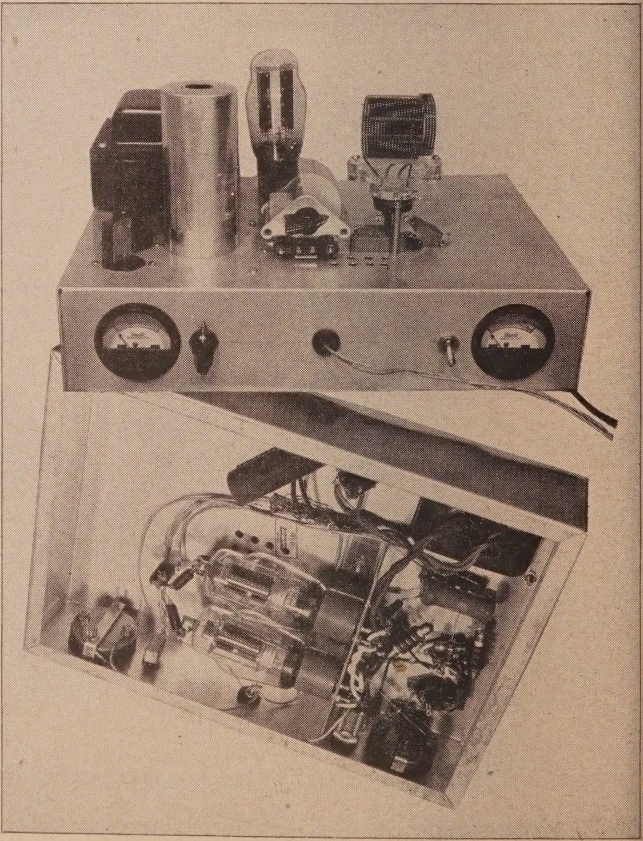
Price of the kit is $49.95. The purchaser must supply his own hookup wire, telegraph key and antenna. A ready-to-operate model is available for an additional $15.00.

Assembling The Kit

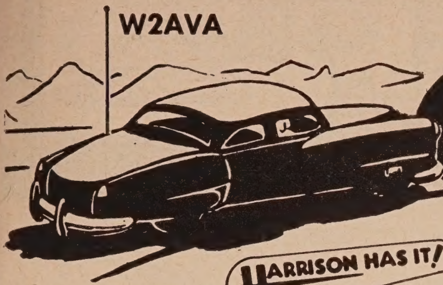
Complete, step-by-step instructions are furnished for assembling the *Model 75* kit. The first step is preparing the chassis, which, being of aluminum, is not difficult with ordinary hand tools. Once the chassis is drilled, it is comparatively simple to mount the parts and wire them according to the step-by-step instructions.

Incidentally, I asked Mr. John Dixon, the manufacturer, about the possibility of obtaining a punched

(Continued on page 93)



The Dixon Model 75 transmitter kit reviewed in this month's column. Capable of seventy-five watts input on all amateur bands to 29.7 Mc., it uses a pair of 807's driven by a 6AG7 crystal oscillator. The 807's are located below the chassis, and parallel plate feed removes the d-c plate voltages from the exposed tank-circuit components. It is available from The Dixon Electronics Co., 13444 West McNichols Rd., Detroit 35, Mich.



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Complete Station for 2 Meters

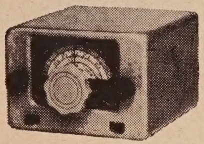
$199.50

Compact receiver-transmitter with built-in speaker and 19" whip antenna. Output 5-7 watts. Tuning eye metering on all stages. Built-in noise limiter. Takes crystal or carbon mike. Crystal control (8 mc xtals). Operates on 110V. AC and 6V. DC. With tubes. Less crystal and mike.

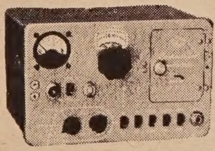
GONSET "SUPER 6" CONVERTER

10, 11, 15 20, 40, 75 Meters

- **Compact**
- **Rugged**



Also covers 49 and 19 meter SW bands. Plenty of bandspread. High sensitivity on 8 ft. whip. Low drift, noise factor and image response. High-low impedance antenna switch on 40 and 75 meters. RF gain switch and separate broadcast antenna input. 1430 kc. output. With tubes **$52.50**



GONSET "Commander" XMTR

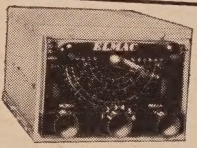
$124.50

35-50 watt xmtr featuring high "Q" high output final. Range 1.7 to 54 mc. continuous. Small enough for underdash mounting. Universal input for any standard carbon or high impedance dynamic or crystal mike. Matches any antenna. With tubes (6AG7, 6146, 12AT7, 2-6AQ5), and plug-in final coils 10 thru 80 meters. Requires 300V. DC @ 200 to 225 ma (phone) and 6.3V. AC or DC @ 3.15 amps. 5½ x 8 x 7"D.

VFO UNIT. Exceptionally stable and compact. Cable plugs into "Commander" xmtr.................. **$29.95**

***NEWS NOTE:** Gonset mobile equipment now available for 12-volt operation. When ordering please specify, if desired. No additional charge.

● **HARRISON HAS IT!** ●



ELMAC 6-BAND RECEIVER

10-tube dual conversion receiver covers 160 meters and broadcast, 80, 75, 40, 20, 15 and 10 meters. 10 tuned circuits provide high selectivity. Built-in noise limiter and BFO. Requires 6V AC or DC at 3.3A; 250V DC at 90 ma. 4½x6x 8½" D.

PMR-6A	**$134.50**
Power Supply for 6V DC.	**$24.50**
Power Supply for 12V DC.	**$24.50**

ELMAC 5-BAND XMTRS

50 watts input. Band switching on 10, 11, 20, 40 and 75 meters. VFO or crystal control on all bands. Dial calibrated for all bands. Use only two controls to QSY! Built-in pi-antenna matching network. Push-to-talk! Needs 400 to 500V DC @ 225 ma, plus filaments. For carbon mike input.................. **$143.00**

For dynamic or crystal mike **$153.00**

Above models less 40-meter band deduct.................. $4.00

RME 5-BAND CONVERTER

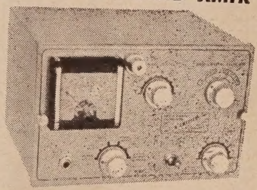
10-11, 15, 20 40 & 75 Meters

$69.50

MC-55

High sensitivity, 3-gang tuning converter with built-in noise clipper. Individual slug-type coils for each band. Input connector for regular car antenna switched from front control knob. Four tuned circuits in IF output. Transmit-receive switch. Requires 25 ma at 150-180V. With tubes, connecting cables and instructions.

BABCOCK 6-BAND XMTR

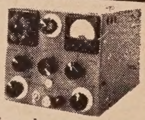


All band and frequency changing (including antenna switching) handled by one switch. Input 35-50 watts. Covers all ham bands, 80 thru 10 meters. Crystals located inside. Complete metering, even RF output wattage. Push-talk antenna and receiver relay. High level speech compression. With tubes (6AQ5, 6146, 12AU7, 2—6AQ5), plugs and instruction manual. 5x 8x7". Weighs only 9 lbs.

Model MT5A	**$99.50**
6V DC Power Supply—	**$67.50**

JOHNSON VIKING MOBILE XMTR KIT

$99.50



Here's a professional mobile rig you can easily build yourself. Takes up to 60 watts input with 100% AM modulation. Bandswitching 75-20-10 meters, plus space for one additional band. Crystal switching for quick QSY. VFO input. Antenna and power changeover switch. Output to coaxial cable. Operates with any DC (or AC) supply delivering 300 to 600V at about 200 ma. Complete kit with instructions and drilled chassis. Less tubes, crystals, mike and power supply.

SHURE CARBON MIKE

Clear, crisp voice response. High output. Heavy duty switch for push-to-talk operation. With hook for suspension and bracket for wall mounting, plus cord and cable. **$16.17**

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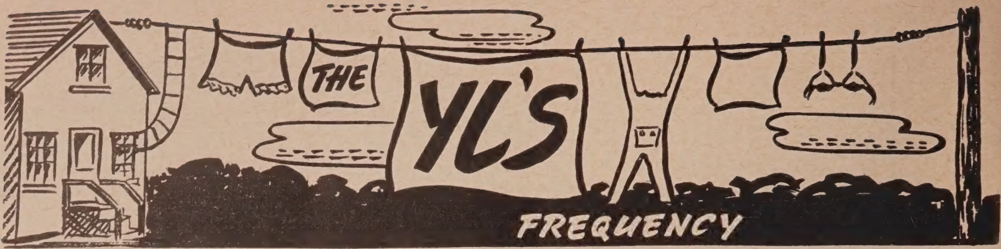


THE YL'S FREQUENCY

Monitored by LOUISA B. SANDO, W5RZJ

959-C 24th Street, Los Alamos, New Mexico

OFFICIAL PHOTOGRAPH, U. S. NAVY.

W3MSU, our cover girl.

Did you notice our cover girl? She's none other than W3MSU, Ethel Smith, and she's trying out a new mobile rig which W3NL, Andy, built especially for her new *Henry J*. Ethel is well known to many of the gang as founder of the YLRL and as an active operator for many years. We had a write-up about her in these pages in the Oct. '49 issue, but a few notes are in order to bring you up to date.

W3MSU has been operating mobile only a few months, but prior to that she acted as second operator for W3NL at his control station during mobile club exercises. She has helped out during CAP exercises and on the *Muscular Dystrophy Campaign* collections (during which mobiles alone collected $10,000 in one night!).

Active with MARS and with the Naval Reserve, and participating in regular drills with the Organized Surface Division W-2, Ethel also drills on the air with Net Able, using her Navy call N0ABO.

Last year Ethel was president of the Washington Radio Club where she organized training classes in code and theory. To date at least 12 or 15 licenses have resulted from these classes, and they are still going strong. Ethel says she and W3CDQ, Liz, spend almost every Friday evening helping out with instruction.

Ethel also organized the Washington TVI Committee. She served as chairman for the first year and is now corresponding secretary. The Committee has handled about 300 cases. W3OQF, Barbie, was coordinator the first year, and now W3RXJ, Irene, is carrying on that job. To raise funds Ethel made up an index, by street address, of the 2,000 Hams in the Washington area. Sales of these have provided more than half of the finances for operation of the TVI Committee.

At home W3MSU runs a *Viking I* with an *HQ-129X* operating into a center-fed Hertz antenna in the apartment house attic! So far she works only 80 and 40, mostly CW. She has a 30 wpm CPC and a 2nd class commercial radiotelephone license. At work Ethel is an Engineering Aide in the Special Research Branch of Radio Division III of the Naval Research Laboratory.

Holsteins Turn Hams

Talk about Ham families! Just take a look at the photo. This is the way it came about. Two years ago Fred Holstein was told he'd have to get a commercial license for experimental work. He started in from scratch, and the rest of the family followed suit. Here are the results:

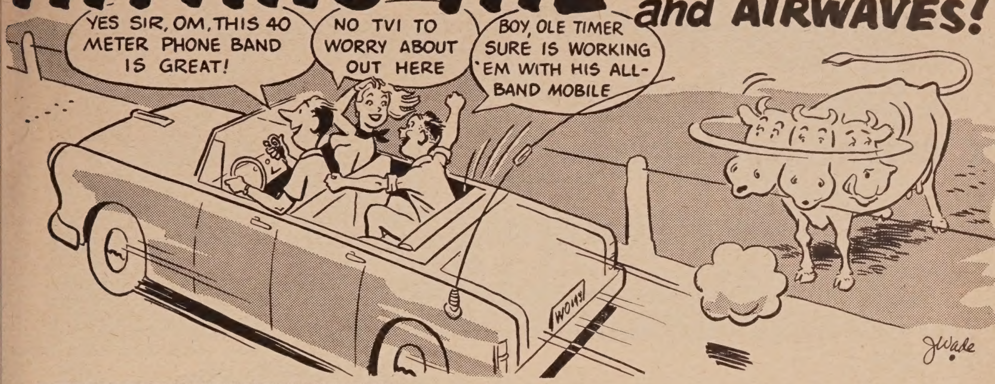
Fred (chief op)	W2LEP	Class A	
Ruth (XYL)	KN2CMO	Novice	
Fred, Jr.	W2KXO	Class A	Age 16
Donald	W2EBV	General	13
Carole Ann	KN2AID	Novice	10
Nancy	(nearly ready for exam)		7
Quentin	(calls CQ in glass when he wants a drink!)		2½

Fred says that they operate two bands at a time

(Continued on page 100)

The Fred Holstein family. L. to r.: Quentin; Fred, Jr., W2KXO; Carole Ann, KN2AID; Donald, W2EBV; Fred, Sr., W2LEP; Ruth, KN2CMO, and Nancy.

HITTING THE HIGHWAYS and AIRWAVES!


YES SIR, OM, THIS 40 METER PHONE BAND IS GREAT!
NO TVI TO WORRY ABOUT OUT HERE
BOY, OLE TIMER SURE IS WORKING 'EM WITH HIS ALL-BAND MOBILE
WOW!
JWade

ELMAC Model A-54 Wired for 10, 11, 20, 40 and 75 meters. Only $143.00

Model A-54H. Same as above but for crystal or dynamic mike. Only $153.00

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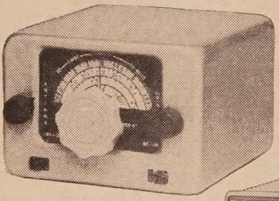
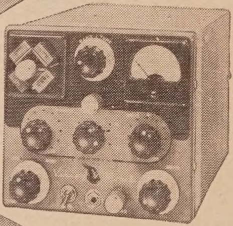
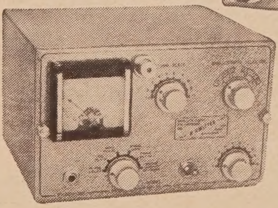
When you hear the call of the open road, it's time to equip with a brand new mobile rig from Walter Ashe. His fabulous "Surprise" Trade-In Allowance enables you to get the new, compact, more efficient units of your choice at tremendous savings! And the creation of the 40 meter phone band makes a mobile installation more exciting than ever before. So get in on the fun. Trade your used (factory-built) communication equipment now. Wire, write, phone or use the handy coupon.



GONSET SUPER 6 CONVERTER. Covers 10, 11, 15, 20, 40, 75 meters plus 19 and 49 meter BC bands. Only $52.50



JOHNSON VIKING MOBILE KIT Model 240-141 Only $99.50



BABCOCK Model MT-5A Mobile D-XMITTER Only $99.50

MORROW 5 BAND CONVERTER Model 5BR. Covers 10, 11, 15, 20, 40, 75 and 80 meters. Only $74.95

ELMAC New Mobile Receiver Model PMR-6-A. Dual conversion, 10 tubes, BFO, noise limiter, covers all amateur bands, 10 through 160 meters plus BC band. Measures only 4½″ H. x 6″ W. x 8½″ Deep. Only $134.50

MASTER MOBILE All-Band center loaded mobile antennas with coil for one band (20, 40 or 75 meters). Only $8.57. Extra coils for above bands. Only $3.23 each

CARTER GENEMOTORS. Furnish "B" power for mobile transmitters. Small and compact. Model 450AS. 6 volts at 29 amps input. 400 volts DC at 250 MA output. Only $45.68

Model 520AS. 6 volts at 28 amps input. 500 volts DC at 200 MA output. Only $46.46

MALLARD New Mobile Antenna Base Loading Coil for 40 Meters. Model HI-Q 40 Coil. Only $7.95

STANCOR Model ST-203A 10-11 Meter Kit. (Simple conversion instructions for other bands.) Only $47.50. Wired and tested. Only $66.75

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in the expanding electronics field will be enhanced by the all-around experience gained. As the employment of commercial electronic systems increases, you will find this training in the most advanced techniques extremely valuable.

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Assurance is required that the relocation of the applicant will not cause the disruption of an urgent military project.

6-METER STORY

(from page 56)

COMPARISON of TRANSCEIVERS

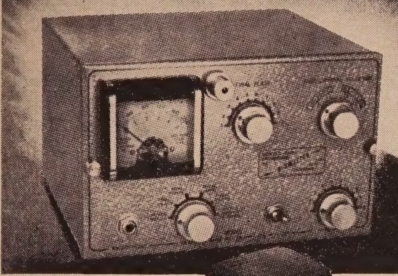
	No. 1	No. 2	No. 3
No. of tubes Tx.	6	6	5
Power output Tx.	2 watts	3 1/2 watts	1 watt
Xtal frequency	8 Mc.	8 Mc.	8 Mc.
No. of tubes Rx.	5	7	5
Type of Rx.	Super-Regen	Super-infra	Super-Regen
Rx. Tuning	Fixed	Fixed Xtal	Variable
Rx. Tuning Range	47-56 Mc.	49-54 Mc.	49-54 Mc.
Battery Drain	5.5 amps.	8 amps.	4.0 amps.
Output Impedance	50 ohms	50 ohms	50 ohms
Modulator	class AB	class AB	class A
Panel Controls	None (Remote)	2	3
Mounting	Trunk	Dash	Dash
Power Supply Included	Yes	No	Yes

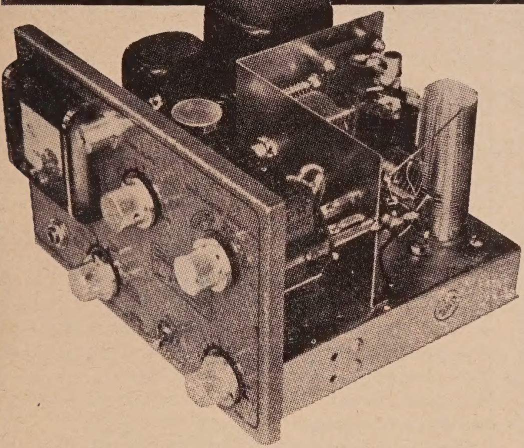
quench frequency of around 15 kc. With the oscillator tuning fixed, it is necessary to tune the i-f amplifier for maximum signal response rather than to set it up on arbitrary frequency. The i-f transformers used tune from 8.3 to 11.6 Mc., a range of 3.3 Mc., which covers almost the entire six-meter band. Regeneration in the detector is controlled by a 50K potentiometer, *R13*, from the 105-volt regulated supply. Transformer coupling between the detector and first audio stage provides good gain and some filtering of the low quench frequency. The output stage, a 6AK6, works into a 4-ohm load in the secondary of the output transformer.

Measurements indicate 1.5 microvolts sensitivity for complete quieting of the super-regenerative hiss with a bandwidth of 60 kc. Voltage regulation of the second detector and screens of r-f, mixer and i-f tubes, together with a crystal-controlled local oscillator, results in an exceptionally stable receiver and a minimum of manually operated controls. Such variable controls as r-f, mixer, oscillator and i-f tuning, as well as regeneration, can be pre-set for optimum performance and left untouched. The only variable then is the off-on switch and the volume control, *R8*, which are located on the front panel, and the press-to-talk switch on the microphone. Send-receive is again accomplished by a d-p-d-t relay which transfers both B+ and antenna. A 3" loud-speaker mounted on the front panel can be cut out by a panel switch when it is desired to localize the output in the handset receiver. Power

(Continued on page 76)

AT ANY PRICE...you couldn't ask for more in a.... MOBILE TRANSMITTER!





40 Watt
BABCOCK MOBILE D-XMITTER
6 Band — Band Switching

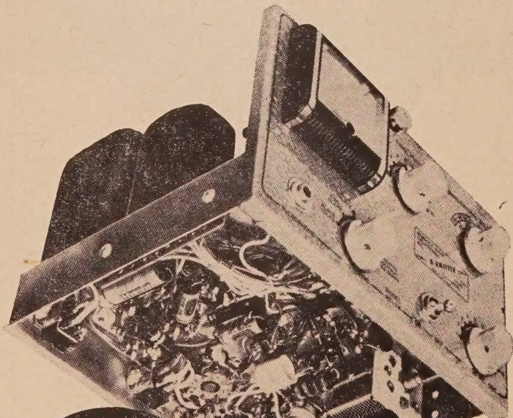
- 2 Bands (3.5-7.3 mc) (14-30 mc)
- 2 Crystal Frequencies per band
- Instantaneous Antenna change-over with LS-1 or LS-2 Units into 8 ft. whip

Features:

- Finest components available
- 6BK5 oscillator
- 6146 final amplifier
- Complete metering, including watts output into 52 ohm antenna load
- Small Size—5" hi., 8" wi., 7" d. Readily adaptable to mobile or home use

ABSOLUTELY GUARANTEED

MT-5A	COMPLETE TRANSMITTER...	$99.50
PS-4A	(6vdc) Dual Vibrator Power Supply, Complete........	67.50
PS-1B	(110vac) Power Supply Complete	44.50
PS-CA	(12vdc) Dynamotor Power Supply, Complete	79.50
LS-1	Antenna Tuning Unit (75 and 10 meters)	15.00
LS-2	Antenna Tuning Unit (20 and 40 meters)	15.00



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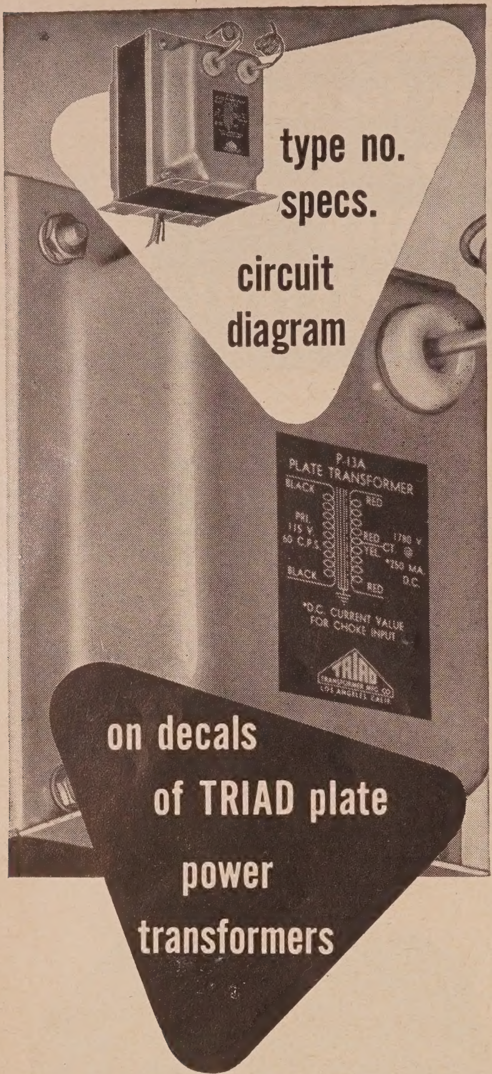

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In addition, these transformers are "Climatite" treated, and tested for proper operation—and their smart grey baked enamel finish will really dress up your gear.
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Write for Catalog TR-52E

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TRANSFORMER MFG CO
WEST COAST ELECTRONIC MANUFACTURERS ASSOCIATION
4055 Redwood Avenue • Venice, California

(from page 74)

requirements are 200-300 volts at 100 ma. and 6 volts at 2.35 amp.

Some Thoughts on Fixed Frequency Operation

The merits of fixed frequency operation are always debatable in amateur ranks, as it restricts band-wide use. But, as a means of ensuring reliable contacts in an emergency it is of immense value. In the Ottawa Area it has been the means of stimulating 6-meter interest in both fixed and mobile operation, as marker signals on the net frequency are almost always available, and operators have come to monitor 50.4 Mc. whenever they are in the station. Mobiles turn their equipment on as soon as they step into their cars and it is rarely that an operator calls in on the net frequency and fails to make a contact. Still, the urge to tune the band is always present. So, with that in mind, the writer has acceded to the demands of our group and designed a simple, compact unit with a tuneable receiver and a low-drain transmitter. It is called the *All Triode Mobile* and is a set which the average VHF mobile enthusiast might attempt with confidence.

All Triode Mobile

This mobile unit features simplicity, low battery drain, tuneable receiver, high level modulation, compactness, and ease of operation and maintenance. The transmitter, receiver, modulator and power supply have been built on one chassis for under-the-dash mounting.

The transmitter (*Fig. 7*), using triodes throughout, delivers 1 watt when used with a 180-volt power supply. A 6J6 is used as a Pierce oscillator-tripler with 8-Mc crystals. This twin triode circuit uses no more components or tuned circuits than the previously described oscillators and has the advantage of providing usable output with almost any type of crystal. The only adjustment in the oscillator is selection of the feedback capacitor value *C1*. The 25-Mc tripler will also double effectively if 12.5-Mc crystals are available. A 6C4 acts as a frequency doubler to 50 Mc. and a split tank is used to feed the push-pull grids of the power amplifier. A word of caution in center tapping this coil: Its position should be determined by measuring the voltage at the grids of the 6J6 final and moving the tap upwards or downwards until equal voltages are read at the 6J6 grids. Metering of the drive for exciter tune-up and neutralization is done across a 1200-ohm resistor, *R6*, at the junction of the grid resistors. A minimum of 2 ma. should be obtained at this point, which represents about 15 volts drive per grid. The 6J6 final is neutralized by two pieces of 72-ohm twin lead, each 1¾-inch long soldered across the grids and plates at the tube socket. These are clipped off equally until no flicker in grid current is observed when tuning through resonance with the final plate voltage disconnected. The r-f

(Continued on page 78)

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Gonset "SUPER 6"—6 Band Amateur Converter	$52.50
Gonset "Commander" 35-50 Watt Multi-Band XMTR	$124.50
New Morrow GC-10 Generator Noise Filter	$3.75
Babcock MT-5A MOBILE D-X Mitter	$99.50

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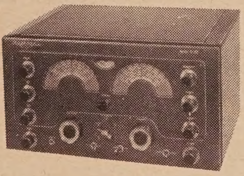

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(LESS SPEAKER) $369.50

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AUTOMATIC DUAL CONVERSION

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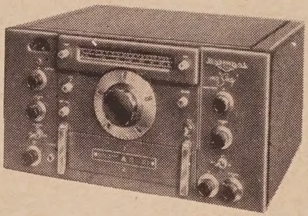
(less speaker)



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A MESSAGE FROM Carter

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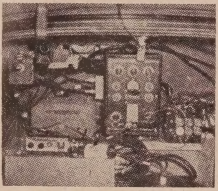

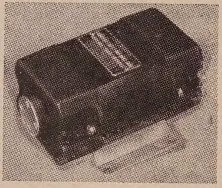

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Carter Motor Co.
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Chicago, Illinois

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Address..

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(from page 76)

choke, *RFC2,* shown is a six-meter frequency-rated one as described in *Ham News,* January-February, 1949.

A 12AT7, as described previously, is used as grounded-grid preamplifier and clipper-driver with restricted frequency response, followed by a 6V6 class A modulator. The primary of a push-pull output transformer is used as a modulation choke.

The receiver (*Fig. 8*), uses 5 tubes in a super-regenerative circuit. The r-f amplifier employing a 6AG5 sharp cut-off pentode with fixed bias is tuned by its input capacity and a variable iron core in the antenna coil. The input circuit, when tuned to 50.4 Mc. is roughly resonant over a range of 2 to 3 Mc. and can be peaked at any frequency between 48 and 55 Mc. The detector is the ultraudion type with fixed regeneration and voltage regulation. The tuning range of the receiver, variable from the front panel, is 49 to 54 Mc. Regeneration is set by a screw-driver adjusted potentiometer. The detector is a 9002 triode but a 6C4 may be substituted with similar results. A two stage resistance coupled audio amplifier, using a 6C4 and 6AQ5, is incorporated for loudspeaker operation. Volume is adjusted by a front panel control, *R6,* in the grid of the first audio tube. Audio output is brought out to two positions, one a phone jack and the other a pin on the handset connector. The correct output impedance is 4 ohms.

A dynamotor delivering 150 volts as 85 ma. supplies power to both transmitter and receiver, and the send-receive relay makes the B supply available to either unit, disabling the other when in use. A 200-volt 100-ma vibrator supply is also a convenient and economical power supply for use with this equipment.

Tuning Hints

The writer does all output tuning with a field strength meter, after installation in the car. The exciter portions of all three transmitters can be aligned on the bench with the aid of a 0-5 ma. meter in the final grid circuit, adjustment being made for maximum reading. The final is peaked for maximum output as indicated on a field strength meter. Some measure of loading adjustment is possible by use of the series variable capacitor in the antenna link and compensates for variations in transmission lines and antenna lengths. Normally the link is inserted into the final coil form and cemented in place for extreme rigidity.

The three transceivers described above are the result of three different approaches to six-meter mobile problems. All have their disadvantages and short-comings. The last one described has met with most favour in the Ottawa Area, perhaps due to its tuneable receiver and simplicity. *Ottawa Six Meter Emergency Net* now boasts twelve fixed and six mobile stations, and it is hoped that the all triode six-meter mobiles will stimulate further activity on this band both in Ottawa and elsewhere.

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All feature high speech intelligibility, ruggedness, press-to-talk switch for operating relay and are provided with handy mounting bracket.

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AMPHENOL Folded Dipole Amateur Antennas

again available. Each antenna has 75 ft. 300 ohm lead-in. Flat-top portion is #16 copper-clad steel twin-lead. With instructions.

139-010	10 Meters	5.24
139-020	20 & 15 M.	5.88
139-040	40 Meters	7.64
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JOHNSON Viking Mobile Kit

A mobile powerhouse, up to 60 watts. Band-switching, 4-position crystal selector, fully metered and with many other outstanding features. 240-141 KIT, less tubes, crystals, microphone and power supply. **99.50**

This kit as well as the famous Viking I, Viking II and VFO are available wired and air-tested, or unwired but with tubes, etc. Write W2BUS for special prices.

GONSET "COMMUNICATOR"

A truly fine and self-contained communications station complete with 19″ whip antenna ready for operation. Weighs 16 lbs. • Output 5-7 watts on 144-148.3 Mc • Operates on 110 Volts AC and 6 Volts DC with no other power supplies required • 10 tube 6BQ7 cascode receiver with a noise clipper that really works • Sensitive built-in speaker • Only 10 x 9 x 7 inches • Uses carbon, crystal or dynamic mike • Over 100 mile range.

COMMUNICATOR, with tubes but less crystal and mike ...**199.50**

COMMUNICATOR, complete with crystal, BRUSH crystal microphone, cord and plug—NOTHING ELSE needed to go on the air. **205.95**

TECRAFT Crystal Controlled CASCODE CONVERTER

Low noise, 1 microvolt gives 20 db quieting, high sensitivity, 0.1 microvolt provides a signal 6 db over noise level. The ultimate for top performance. Power supply of 150 to 250 volts required.

CV-2 — 144-148 Mc.	42.50
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Hallicrafters HT-20 transmitter, 100 watts, TBI suppressed. Continuous coverage from 1.7 Mc. to 30 Mc. with full band switching. Choice of 10 crystals. Less microphone and crystals **449.50**

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ELMAC A-54 TRANSMITTER

A-54 is an excellent mobile or fixed station transmitter. Only 7½ x 7½ x 12″, will tuck away anywhere but can take a husky 50 watts input. Bandswitching provides 10, 11, 20, 40, 75 and 80 meters. VFO-xtal selector switch provided.

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Powerful mobile 35-50 watt transmitter covering 1.7 to 54 Mc. Not a kit. With tubes, less pwr. supply. **124.50**

GONSET VFO for Commander **29.95**

New SONAR SRT-120 Multi-Band XMTR

A compact TVI-proofed 10, 11, 15, 20, 40, 75 and 80 meter all-purpose transmitter measuring only 8½x8½x14″ packing 100 watts phone or 120 watts CW. Suitable for mobile or fixed station with selection of power supply.

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All other SONAR products in stock.

ROBERT DOLLAR Model 222

New TWO METER quality mobile transmitter. With tubes, less crystal, mike and power supply. **89.50**

Model 226—Companion receiver. **99.50**

GONSET "SUPER SIX" CONVERTER

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TERMINAL carries all GONSET products. Hams with Tri-Bands or Supers who have acquired 12 volt cars, write W2BUS for free modification instructions.

ELMAC PMR-6-A 6-Band Receiver

Elmac has designed this receiver to be the finest possible in its class without regard to cost. Dual conversion, ten tuned circuits, six bands covering all the amateur bands from 10 meters thru 160 meters plus the broadcast band, less than 1 microvolt to produce 3½ watts audio output, effective noise limiter and many, many other features.

PMR-6-A—Less power supply **134.50**

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VFO now available for your BANDMASTER Transmitter! High stability Clapp type 6AG7 voltage regulated oscillator. Six bands — 10, 11, 15, 20, 40 and 75-80 meters. May also be used with other transmitters. About 300 volts @30 Ma. and 6.3 V @0.65 Amps required for power.

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Mobile remote control panel **22.50**

Rack panel, 12½x19″, mounts Bandmaster and APS-50 .... **5.75**

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132 Spring Swivel Mount	8.75

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Stacked 4-Element Co-ax Antennas for RG-8/U cable

SC—2 meters	34.95
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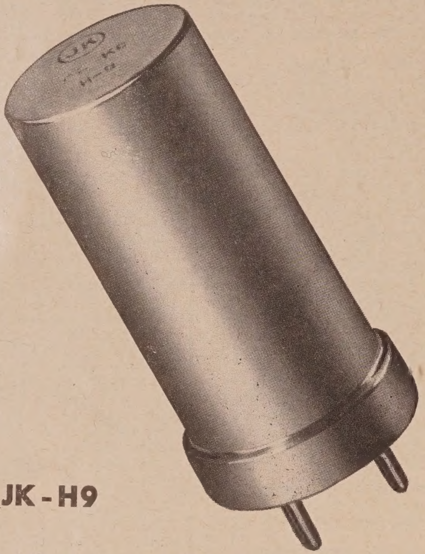

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CALIBRATOR

(from page 58)

sensitivity, the output lead from the *FCC-90* may simply be inserted inside the converter case, and left floating. If the pickup is too little, the standard's output lead should be connected to the receiver antenna through a small coupling capacitor.

Some means should be provided to energize the low power stages of the transmitter without the application of power to the final amplifier; otherwise the signal from the amplifier will overload the receiver, and it will be impossible to obtain the correct beat with the frequency standard.

When the transmitter frequency is to be checked for phone operation near the edge of a band, do not zero beat the frequency with the standard frequency, for by doing so, the audio sidebands produced by modulation of the carrier may extend beyond the legal limits of the band. This is a point often overlooked. It is the cause for many an amateur operator receiving a pink ticket for out-of-band phone operation, even though the carrier itself was within the band. A safe path is to adjust a beat of at least 3000 cycles, but be sure this beat is made on the correct, or in-band, side of zero beat.

TNS

(from page 41)

noise disappeared, leaving the loudspeaker silent. The audio remained in this state, while tuning around the band, until a carrier was encountered, upon which the squelch was automatically triggered and the audio component of the signal was heard in the speaker. Cessation of the carrier immediately placed the squelch in operation, and the speaker was again silenced. With the extremes indicated above, a moderately strong carrier was required for satisfactory operation. By backing off on the squelch control to a point where it was at the critical threshold level, and where only light background noise was barely perceptible, a weak carrier would trigger out of the squelch, permitting the audio to be heard.

All of the preceding tests were made on the bench, so the next step was made by testing the units in the car. Here again, and under severe highway noise conditions, the TNS performed better than the full-wave series limiter in regards to audio-to-background noise ratio, and with better intelligibility. Bringing the squelch control into action produced results similar to those experienced on the bench, except that the average level of the general noise pickup had a tendency to trigger out the squelch, as it was set on the bench; however, a new setting of the squelch control to the point

(Continued on page 82)

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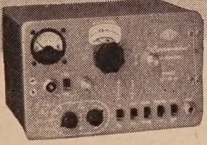
get your gear for the road at ALLIED



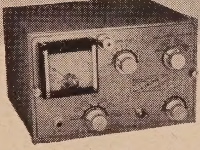
Gonset 3016 "Commander"

All-band phone-CW xmitter for under-dash mount. Covers 1.7 to 54 mc continuously. With plug-in coils for 80, 75, 40, 20, 15 and 11-10 meters. Up to 50 watts input on CW, 35 watts on phone. Complete with tubes and 2 plug-in coils; less crystal, mike and key. Requires 300 v. DC at 200-225 ma and 6.3 v. at 3.15 amps. Shpg. wt., 8 lbs. **98-041.** Net........**$124.50**

VFO 3020 Tuning Head for VFO control on 75, 20, 15 and 10 meters. Shpg. wt., 3 lbs. **98-042.** Net........**$29.95**

"Super-Six" Converter

Covers 75, 40, 20, 15, 11-10 meters, and 19 and 49 meter bands. For use with any 1430 kc receiver. Supplied complete with tubes. Shpg. wt., 5 lbs. **84-913.** Net........**$52.50**



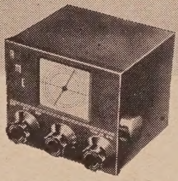
Babcock MT-5A D-X Mitter

Deluxe mobile transmitter; 2 ranges, 3.5-7.3 mc, 14.0-30 mc; covers 80, 40, 20, 15, 11-10 meters. Choice of 4 crystals, 2 in each range. Easily modified for CW. 35 watts input with power supply below. Use with single-button carbon mike. Requires 425 v. DC at 250 ma., 6 v. at 2.75 amps. With tubes; less mike and crystals. Shpg. wt., 12 lbs. **98-791.** Net........**$99.50**

PS-4A Mobile Power Supply. Operates from 6 v. DC. Shpg. wt., 15 lbs. **98-792.** Net........**$67.50**

LS-1 2-Band Antenna Tuner. Use with 8-ft. whips. Easily pre-tuned for 10 and 75 meters. Built-in 6 v. relay selects proper section of tuning unit. Shpg. wt., 7 lbs. **98-793.** Net........**$15.00**

(12 v. DC equipment also available)



RME MC-55 Converter

5-band coverage: 10-11, 15, 20, 40, 80 and 75 meters. High sensitivity; 3-gang tuning; noise limiter; 4 tuned circuits in IF output. Complete with tubes, cables, underdash brackets. Requires 150-250 v. DC at 30 ma and 6.3 v. at .92 amps. Shpg. wt., 6 lbs. **98-032.** Net........**$69.50**

RME MC-53 Converter

Similar to above, but covers 2, 6 and 10-11 meters. Complete with tubes. Shpg. wt., 6 lbs. **98-031.** Net........**$66.60**

Sonar MR-4 Receiver

Ideal compact mobile set covering 3.5-4.0 mc, 7-7.3 mc and 14-14.4 mc (80, 75, 40 and 20 meters). Unusual sensitivity, 1 mv for 1½ watt of audio; ANL; BFO for single sideband reception; temperature-compensated oscillator; edge-lighted dial. Very rugged construction. Requires 200-300 v. at 60-100ma and 6.3 v. at 2.4 amps. Coax antenna input. Complete with tube and universal mounting bracket. Shpg. wt., 6 lbs. **98-783.** Net........**$89.95**

MOBILE ACCESSORIES

Dow Coax Relays for coax antenna changeover. Handle up to 1000 watts. Simultaneously operates external SPDT switch (below) for opening receiver B+ when transmitting. **75-798,** for 110 v. AC, **$10.50. 75-797,** for 6 v. DC, **$9.50**
75-799. SPDT Switch. Actuated by relay........**$1.00**

Electro-Voice Carbon Mike. Response 100-4000 cps. Output, −50 db. With 5-ft. cable. **99-587**............**$9.70**

Johnson Viking Mobile Kit

Up to 60 watts input on 75, 20 and 10 meters. Complete bandswitching; gang tuning; 4-position crystal selector, additional position for external VFO; output matches 52-ohm coax. For use with any type mike. Requires 600 v. DC at 200 ma, 6.3 v. at 3.75 amps. All parts and cabinet supplied; less tubes, crystals and mike. Shpg. wt., 16 lbs. **98-056.** Net................**$99.50**

Eimac A54 Xmitter

For mobile or fixed station. Up to 50 watts input, phone or CW. For 80, 75, 40, 20, 11-10 meters. VFO and Pierce crystal osc. Requires 6 v. at 4.5 amps, 500 v. DC at 225 ma. With tubes; less crystals and mike. Wt., 17½ lbs. **98-087.** For carbon mike. Net.........**$143.00**

Model A54H. As above, but for use with crystal or dynamic mike. **98-088.** Net.........**$153.00**

PSA-500 Power Supply. Delivers 375 v. DC at 250 ma, 6.3 v. AC at 5 amps. For 115 v. 60c. AC. 19 lbs. **98-086.**..................**$39.50**

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NEW AMATEUR EQUIPMENT RELEASES

Bud CPO-128 Codemaster

Serves as code practice oscillator, CW monitor and modulation monitor. Has built-in speaker; handles up to 20 headsets; any number of keys may be connected in parallel for group code instruction. As monitor connects to small RF pick-up loop adjacent to xmitter stage. For 110-120 v. AC or DC. Shpg. wt., 5 lbs. **73-044.** Net....................**$14.19**

CPO-130 Codemaster. As above, but without built-in speaker. **73-045.** Net...**$12.94**

Gonset "Communicator"

Complete 2-meter Amateur phone station in one portable case—for battery or AC operation. Delivers 5 to 7 watts output on AM phone; receives with a highly sensitive superhet. Has 19″ whip for receiving and xmitting. 10¼ x 9¼ x 7″. Complete with tubes; less mike and 8 mc crystal. For 110-120 v. 50-60 c. AC or 6 v. DC. Wt., 24 lbs. **84-912.** Net...............**$199.50**

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New *Heathkit*
GRID DIP
METER KIT

MODEL GD-1
SHIPPING
WT. 4 LBS.

$19.50

Complete unit easily held and operated with one hand.

A valuable addition to any ham shack.

The INSTRUMENT FOR HAMS — has numerous transmitter applications such as pretuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, design and many others.

Receiver applications include measuring C, L and Q of components — determining RF circuit resonant frequencies, etc.

Covers the 80, 40, 20, 11, 10, 6, 2 and 1¼ meter bands. Complete coverage from 2-250 MC.

Easy one hand, one unit operation. Convenient thumb wheel drive of tuning condenser leaves one hand free for making circuit adjustments. No tuning head and meter with connecting cable to worry about. *It's compact — case only 2½" wide x 3" high x 7" long.*

All plug-in coils (rack included) are wound and calibrated—no coil winding, drilling, punching, forming or painting to do — all fabrication is complete, and the kit goes together smoothly and easily.

The 500 microampere Simpson meter movement and sensitivity control allow operator to set instrument for easy detection of dips on all ranges. Instrument is transformer operated for safety. You'll like the appearance of this kit with its baked enamel panel and crackle finish cabinet.

Please include postage to cover parcel post and insurance for 4 pounds.

HEATH COMPANY
BENTON HARBOR 6,
MICHIGAN

(from page 80)

where the background noise either dropped out completely, or was extremely light, could be obtained. Under severe noise conditions, the squelching arrangement not only eliminates the tiring background grind, but also enables one to easily find even a weak carrier—it just pops up out of the blue, so to speak. With the usual type of noise limiter, even a moderately strong carrier is sometimes hard to find in the background noise, unless the carrier has modulation on it.

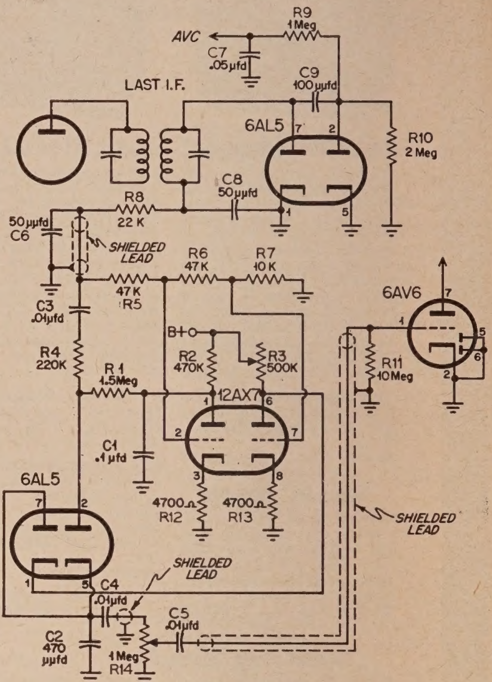


Fig. 2. Parts list and schematic of the modified Twin Noise Squelcher.

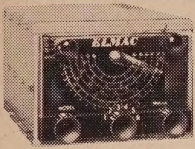
R1—1.5 megohm
R2—470,000 ohms
R3—500,000-ohm pot.
R4—220,000 ohms
R5, R6—47,000 ohms
R7—10,000 ohms
R8—22,000 ohms
R9—1.0 megohm
R10—2 megohms
R11—10 megohms
R12, R13—4700 ohms
C1—0.1 μfd.
C2—470 μμfd.
C3, C4, C5—0.01 μfd.
C6, C8—50 μμfd.
C7—0.05 μfd.
C9—100 μμfd.

With the squelch control set at the point just below the threshold, a steady background of strong sharp ignition pulses from our own car, as well as those from other high-level ignition sources, could be heard at a moderately low level. This appeared to be leakage of some sort, because it could still be heard when the tubes were removed from the limiter. Since the input and output leads to the limiter were separate and shielded, and

(Continued on page 84)

25th ANNIVERSARY YEAR

HARVEY HAS THE MOST COMPLETE STOCK OF MOBILE GEAR



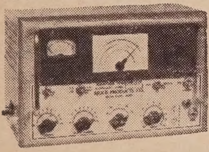
The New ELMAC PMR 6-A

Portable Mobile Receiver

A complete 10-tube dual conversion, communications receiver. Provides coverage of 6 bands from 10 to 80 meters as well as broadcast and 160 meter band.

Dimensions: 4½" high, 6" wide, 8½" deep. **Weight:** 6½ lbs.

Complete with tubes **$134.50**
(less power supply)



ELMAC A54

Under-dash Mobile Xmtr.

Measures: 7½" x 7½" x 12"
Weighs: 14½ lbs.

Covers 10, 20, 40 and 75 meter bands.

For Carbon Mike Input	$139.00
For Dynamic or Crystal Mike,	149.00
Power Supply, 110 volts AC,	39.50

FOR YOUR SPECIAL NEEDS

Harvey Carries Complete Stocks for Immediate 'Off-the-Shelf' Delivery

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SINGLE SIDEBAND EQUIPMENT
By Central Electronics, Eldico, Millen and others.

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All makes and types
TRANSISTORS, GERMANIUM DIODES, SUBMINIATURE TUBES
ETC.

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SPRAGUE NON-INDUCTIVE RESISTORS
For Rhombic Antenna Termination, and other applications:

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CAMBRIDGE THERMIONIC COILS

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Brand New Model 425
WESTON RF AMMETER
3½ dial, non-glare glass.
Range: From 0 to 2.5 mps.
Special **$8.95**

A HARVEY SPECIAL

#7 Stranded Wire

Heavy Duty Rubber Covered — Tinned. Ideal for Hooking Up Mobile Supplies. 50-foot lengths:......................each **$4.95**

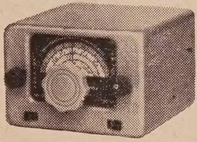
NOTE: In view of the rapidly changing market conditions, all prices shown are subject to change without notice and are Net, F. O. B., New York City.

SONAR Model SRT-120 Transmitter

For mobile and fixed location operation. Has band-switch for 80, 75, 40, 20, 15, and 10 or 11 meters, plus spare position for any future band. Has provision for two crystals or external VFO head. Final amplifier employs the new Amperex 9903/5894A tube. Power input is 120 watts on CW, and 100 watts on phone. All circuits metered. Power requirements: 600 volts dc at 350 ma, and 6.3 volts at 6 A.

Complete with Tubes	$198.50
External VFO Head	19.50
SONAR MR-4 Receiver	**$89.95**

GONSET "SUPER 6"

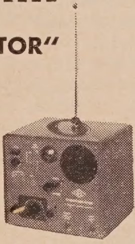


Six Band Amateur Converter

A compact converter covering 10, 11, 15, 20, 40, and 75 meter phone bands. Also covers 6 mc. (49 meter) and 15 mc. (19 meter) short wave broadcast bands. Uses 6CB6 low noise rf stage, with panel controlled antenna trimmer, 6AT6 triode mixer, 6C4 modified Clapp oscillator, and 6BH6 IF stage.

Complete with Tubes.............................. **$52.50**

GONSET "COMMUNICATOR"



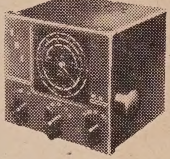
A complete two-way station for 2 meter band operation. Suitable for mobile or fixed location use. Receiver is a sensitive superheterodyne with built-in noise clipper circuit and 6BQ7 Cascode rf stage. Transmitter uses 2E26 in final 15 watts input. Employs 8 mc. crystals for stability, and has a range of over 100 miles. Operates on either 110 volts AC or 6 volts DC. Weight approx. 16 pounds.

Complete with Tubes (less crystal and microphone) **$199.50**

Also available for commercial or airport Unicom applications.

With crystal **$299.50**

HARVEY Carries a Complete line of all Makes and Types of MOBILE ANTENNAS for Immediate Delivery — Master Mount Pre-Max, Ward, etc.

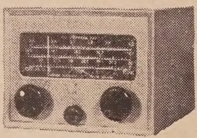


The New Model MC-55 RME MOBILE CONVERTER

Covers all ham bands from 10 through 80 meters in five ranges. Sensitivity on all bands is 1.25 microvolts. Operates with antenna input impedance of either 50 or 72 ohms. Separate input connector permits use of regular antenna when control knob is in position for broadcast reception. Requires only 150-180 volts at 25 ma. Four tuned circuits in i.f. output stage provides high signal-to-noise ratio. Output frequency is 1550 Kc.

Complete with Tubes (less power supply)........................ **$69.50**

MORROW CONVERTERS



The latest in Mobile Converter ... Easy to operate ... Sturdy construction for long, trouble-free service.

Model 5BR
For 10, 11, 15, 20, 40, 75, and 80 meters. **$74.95**

Model 3BR
for 10, 20, and 75 meters............ **$64.95**

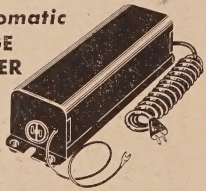
The New VFO for your Harvey-Wells Bandmaster

Fully efficient on all bands occupies no extra space. **$47.50**

HARVEY-WELLS Bandmaster Model TBS50

Senior Model	**$111.50**
Deluxe Model	**137.50**

G.E. *Automatic* VOLTAGE STABILIZER

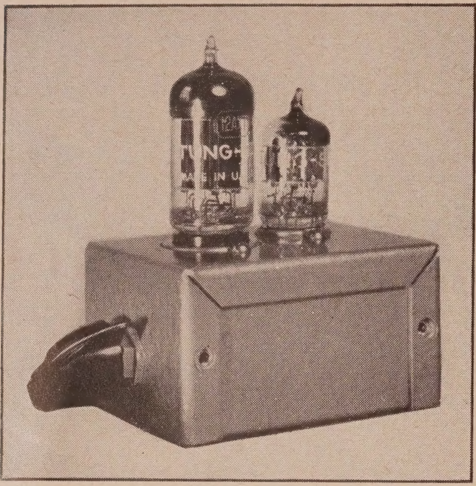


SPECIAL
$ 8.95

Provides constant 115-volt output with an input variation of from 95 to 130 volts. Stabilization is held within 1%. Rating is 30 vA, 60 cycles.

Harvey RADIO CO., INC.
103 W. 43rd St., New York 36, N. Y. • LUxemberg 2-1500

(from page 82)



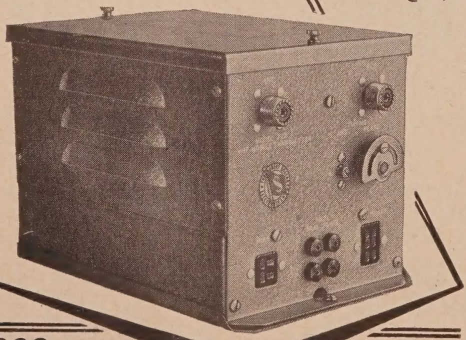
The extremely compact squelch unit.

since this effect was also experienced with the full-wave clipper, it was evident that the fault lay somewhere in the detector-audio circuits of the receiver. This proved to be correct; it was found to be leakage through the common cathode of the duo-diode-triode tube (in this case a 6AV6) which was used for the detector and first a-f stage. A 6AL5 twin diode was then installed to separate both the detector and the a-v-c tube circuits from those of the first audio stage. The revised arrangement is shown in *Fig. 2.* This corrected the situation, and the only background noise now noticeable, with the squelch set just at the threshold, is occasional chattering as the average ignition noise level rises and falls. At this point, a weak carrier will trip the squelch.

By advancing the control further below the threshold point, all background is eliminated entirely, but a stronger carrier is required to trigger out the squelch. With the control set near the threshold, it is surprising to find that extremely high level ignition pulses from big buses and trucks do not trip the squelch, in fact, we have never been cognizant of any additional noise created by buses and trucks, as was the case with other limiters, since the TNS has been installed.

As has previously been pointed out,[2] proper operation of the noise limiter circuits requires a fairly high i-f signal level at the detector, and the performance of the noise limiter system will be impaired if the receiver has low gain in the r-f and i-f circuits. On the other hand, too high a level from the r-f converter, or the front end of the receiver, will cause overloading on heavy ignition pulses, and the ratio of ignition to r-f signal levels will not be handled satisfactorily by the a-v-c system.

In closing, all that can be said is, "Try the *Twin Noise Squelcher,* and really enjoy mobile reception."



THE ROBERT DOLLAR CO ★ ELECTRONICS ★

More power for 2 meter mobile!

Introducing the "222" . . . a new two meter transmitter to meet the demand for greater power output and increased range from mobile units. The 222 is capable of power outputs from 5 to 7 watts with a 300 volt power supply yet satisfactory operation, at decreased output, is possible with 200 volt supplies. The output circuit includes a low-loss antenna changeover relay and an adjustable series-tuned, coupling link for operation into 52 ohm co-ax lines. High level plate modulation, (with P-P 6AQ5's) is used.

The basic intent of the overall design has been to produce a highly stable, (Crystal controlled) transmitter and to apply time-tried-and-proven commercial practice to a new and highly worthwhile piece of amateur equipment.

FREQUENCY RANGE: 144-148 mcs. (Also covers adjacent Civil Air Patrol frequencies)

POWER OUTPUT: 5 to 7 watts into 50 ohms. (300 V supply)

TUBE LINEUP: 6X8 Xtl osc & multiplier, 5763 multiplier, 2E26 PA, 2-6AQ5 mods.

XTL FREQ. RANGE: 8 to 8.222 kcs, FT-243 holders.

MICROPHONE: F1 type required.

(Complete with tubes but less crystal, microphone, and power supply) **$89.50 net**

222 222

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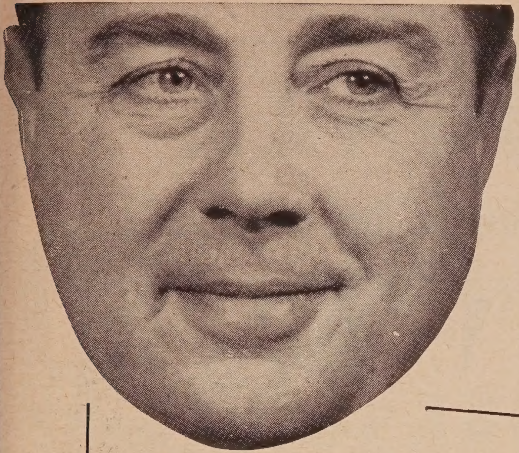
COMMUNICATIONS EQUIPMENT DIVISION

EXPORT AGENTS: M. SIMONS & SON 23 WARREN ST., N. Y. C.



HENRY RADIO *offers* YOU:

LOW PRICES: You can't beat my wholesale prices.

FAST SERVICE: You get fast service. I have big stock of Collins, Hallicrafters, National, Hammarlund, RME, Johnson, Harvey-Wells, Babcock, Lysco, Gonset, Morrow, Elmac, Master-Mobile, Hy-Lite, all other receivers, transmitters, parts at lowest prices.

BIG TRADES: I want trade-ins. I trade big. Tell me what you want—what you have to trade. Get my offer. I pay cash for receivers and transmitters too.

TIME PAYMENTS: Get what you want and pay by the month. I give you better terms because I finance all terms myself. Write for details.

SATISFACTION: I want you to be satisfied. Ask any Ham about Henry Radio.

PERSONAL ATTENTION: You get personal attention. Bob Henry, W0ARA, runs the Butler store. Ted Henry, W6UOU, runs the Los Angeles store. Bob Henry can be reached nearly 24 hours a day, 7 days a week. Write, phone, wire or visit either store. Send us your orders and inquiries. Export inquiries solicited too.

Bob Henry
W0ARA

Butler 1, Missouri
Phone: 395

HENRY RADIO STORES

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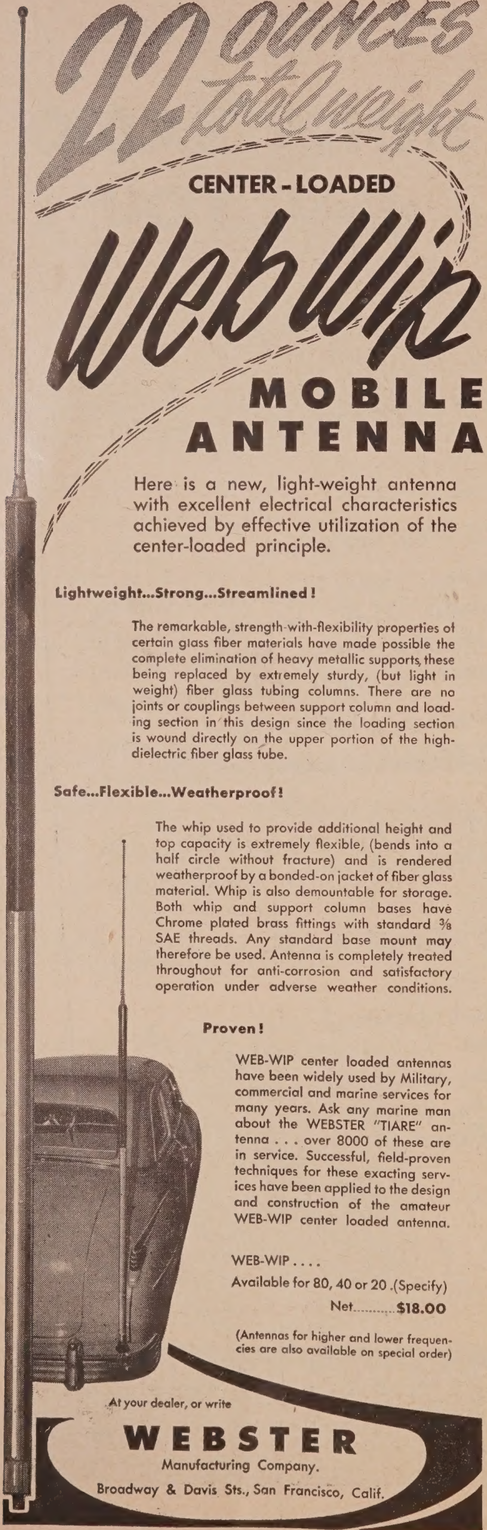
LOS ANGELES 64
BRadshaw 2-2917

"LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"


22 OUNCES total weight

CENTER-LOADED

Web Wip

MOBILE ANTENNA

Here is a new, light-weight antenna with excellent electrical characteristics achieved by effective utilization of the center-loaded principle.

Lightweight...Strong...Streamlined!

The remarkable, strength-with-flexibility properties of certain glass fiber materials have made possible the complete elimination of heavy metallic supports, these being replaced by extremely sturdy, (but light in weight) fiber glass tubing columns. There are no joints or couplings between support column and loading section in this design since the loading section is wound directly on the upper portion of the high-dielectric fiber glass tube.

Safe...Flexible...Weatherproof!

The whip used to provide additional height and top capacity is extremely flexible, (bends into a half circle without fracture) and is rendered weatherproof by a bonded-on jacket of fiber glass material. Whip is also demountable for storage. Both whip and support column bases have Chrome plated brass fittings with standard 3/8 SAE threads. Any standard base mount may therefore be used. Antenna is completely treated throughout for anti-corrosion and satisfactory operation under adverse weather conditions.

Proven!

WEB-WIP center loaded antennas have been widely used by Military, commercial and marine services for many years. Ask any marine man about the WEBSTER "TIARE" antenna . . . over 8000 of these are in service. Successful, field-proven techniques for these exacting services have been applied to the design and construction of the amateur WEB-WIP center loaded antenna.

WEB-WIP . . . .

Available for 80, 40 or 20 .(Specify)

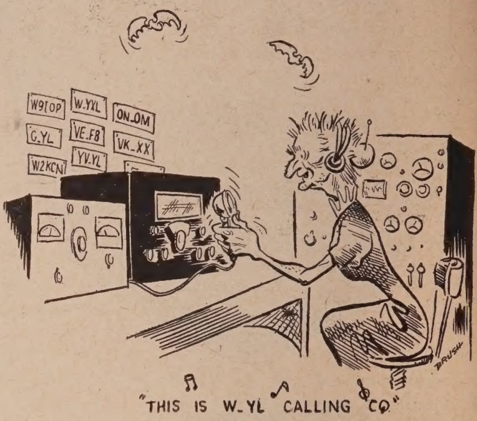
Net........... $18.00

(Antennas for higher and lower frequencies are also available on special order)

At your dealer, or write

WEBSTER
Manufacturing Company.
Broadway & Davis Sts., San Francisco, Calif.

(Tongue in cheek, we offer the brilliant and sensitive artwork shown below, along with our abject apologies to all offended YL's.)



DX NEWS

(from page 68)

Ocean, on April 26th. He will be on 14-Mc CW and Phone. The name is Jack Marsland, an ex-VK7 . . . *YJ1AC* was heard by W1DIT during the recent contest, on 14045 kc., making his first W QSO . . . ZL2MM reports *FU8AB* active on 7075 kc. phone only while W6MUR hears *ZC5VS on* 7015 kc. 1200 GMT. FU8AA skeds. regularly on 14040 kc. . . . *KA0IJ* has been active on 14070 around 0200 GMT while OQ0DZ has been sporting the new OQ0, Ruanda Urundi, prefix on phone, 14175 kc. 1945 GMT.

Exploits

W1FH adds VS9AW to reach 253! . . . **VP8AP** completed his WAS with W7EJH, Nev. John has had his several radio skeds. Interrupted with enforced radio silence periods but will be on again before he departs in May . . . **LU6DJX** soars to 234 with such as ZD7A, VP5BF, AC3QS and 4W1AC . . . **G8IG** reaches 175 A3 with VS9AW. This one puts Bert on 204 CW/Phone . . . **W9HUZ** adds HE9LAA and VR4AB for 194 . . . **GM3CSM** pushes up to 190 with VK1RG and VS9AW . . . **W3FYS** comes up to date with 16 additions to reach 172 . . . **W2SHZ** adds MI3AB, LB6XD and VQ3KIF which gives Eddy 172 . . . **OE1FF** ups to 142 with CR7AD and ZE5JA . . . **W1RAN** adds VK9GM (Norfolk Is.) for No. 140 . . . **W6ZZ** makes it 126 with ZK2AA on 21 Mc. Miles nabbed 4 new ones for 21 Mc. during contest with KL7AMA, YN1AA, ZK2AA and VP7NM . . . **W4A1X** went to 83 with VP8AP, KA9AA, LU4ZI and CP1BX . . . Don, **W6AM**, pushed his phone total to 167 with ZD4BK. See QTH's . . . Lou, **W1MCW**, reached the elusive 200 class on phone with VS9AW. Congrats! . . . **GM2DBX** upped to 160, A3, with GD3UB, 9S4AX, 4X4RE and FQ8AK . . . **W5ASG** goes to 170, phone, with MP4KAC, VS9AW, AP2L, EA6AR and CT3AN . . . **W0NCG** made it an even 150, A3, with **MP4KAC** . . . **VQ4ERR** adds 6L6MY, FL8MY, VS9AW **and ZD7A** to reach top place in the phone listings at 39-220.

W5MIS finally nabbed ZD9AA on 21 Mc. . . . From W1RAN we hear that winners of the recent European DX contest placed as follows: OK1MB, HB9EU, EA1AB,

(Continued on page 88)

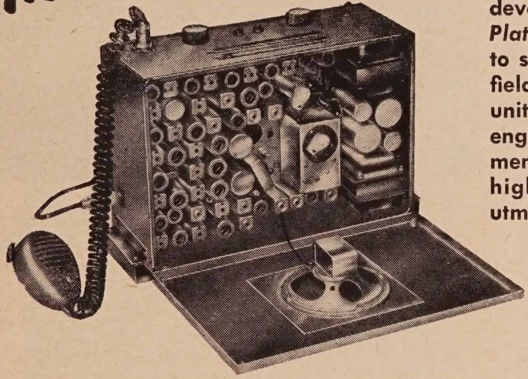
ANNOUNCING

The Newest, Most Advanced 2-Way Communication System Ever Designed!

PLATT MOBILE RADIO EQUIPMENT

MODEL 30-TRM-31

Now, after years of intensive research and development by America's foremost engineers, *Platt Mobile Radio Equipment is out of the lab* to set a new standard in the communications field! It incorporates in one rugged packaged unit all the desirable features that operators, engineers, maintenance men and installation men have demanded for ease of operation, high performance, simple installation and utmost economy.



PLATT MOBILE RADIO EQUIPMENT MODEL 30-TRM-31 (shown). Freq: 152-174 MC. 24 tubes. Dimensions: 14¼" x 9¾" x 5¾".

ALSO AVAILABLE:

Mobile Equip. Model 30-TRM-11. Freq: 25-50 MC.
Base Station Model 30-TRS-31. Freq: 152-174 MC.
Base Station Model 30-TRS-11. Freq: 25-50 MC.

OPERATES IN 152-174 MC BAND

Platt Mobile Radio Equipment Model 30-TRM-31 incorporates a transmitter and receiver mounted on a single chassis which is installed under one cover with a vibrator power supply affording 30 watts of R-F output in the 152-174 megacycle band.

Simplest, Easiest Installation!

Brackets are supplied for installation for front mounting under the dashboard or glove compartment, or in certain installations, under the driver's seat. The controls and loudspeaker are incorporated as an integral part of the cabinet. *Only one short lightweight cable and antenna assembly* are required for complete installation in any vehicle having a 6 volt DC battery system. (12 volts available.)

Finest Components!

The components utilized, without exception, are the very best heat-resistant parts, manufactured for operation at 85° C. without any change in performance.

Competitively Priced!

Platt Mobile Radio Equipment is comparatively low priced, making it an ideal choice for taxi fleets, police, fire departments, forestry, railroads, trucks, civil defense, etc.

Get All the Facts on this Advanced Equipment.

WRITE TODAY FOR YOUR LITERATURE!

PLATT *Manufacturing Corp.*

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Write or Cable:

Prepro the most exciting name in Radio

KANSAS CITY, MO., U. S. A.

100 WATTS

Input on CW
75W Phone
Bandswitching
Transmitter
10-160 Meters

(Available for commercial frequencies on special order —also, integral receiver)

SELF-CONTAINED — FIXED or MOBILE

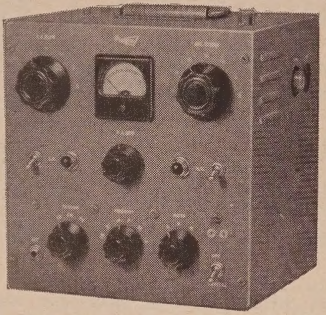
(AC and Dynamotor Supply interchangeable)

Finish and Dimensions: Gray, 10"x10"x8"

● Completely Relay Controlled

Everything at your fingertips . . .
and everything in one cabinet!

All Inquiries Answered



Radio Operators!

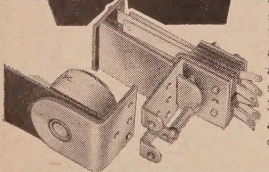
THE GUARDIAN SERIES 200 RELAY . . .

Interchangeable

COIL and CONTACT SWITCH ASSEMBLIES

Save Time—Cut Costs!

★ Coil assembly includes coil and field piece. Contact assembly consists of switch blades, armature, return spring and mounting bracket. Standard and Midget contact assemblies in either S.P.D.T. or D.P.D.T. are *interchangeable* and can be used with any of 13 coils described below.



CONTACT SWITCH ASSEMBLIES

CAT. NO.	TYPE		COMBINATION	
200-1	Standard	8 amps	Single Pole	Double Throw
200-2	Standard	8 amps	Double Pole	Double Throw
200-3	Standard Contact Switch Parts Kit with complete assembly and wiring details			
200-4	Standard	12 5 amps	Double Pole	Double Throw
200-5	Standard	8 amps	Four Pole	Double Throw
200-M1	Midget	8 amps	Single Pole	Double Throw
200-M2	Midget	8 amps	Double Pole	Double Throw
200-M3	Midget Contact Switch Parts Kit with complete assembly and wiring details.			

13 COILS ASSEMBLIES

A.C. COILS* CAT. NO.	VOLTS	D.C. COILS CAT. NO.	VOLTS
200-6A	6 A.C.	200-6D	6 D.C.
200-12A	12 A.C.	200-12D	12 D.C.
200-24A	24 A.C.	200-24D	24 D.C.
200-115A	115 A.C.	200-32D	32 D.C.
		200-110D	110 D.C.
		200-5000D for current type	

*All A. C. coils available in 25 and 60 cycles

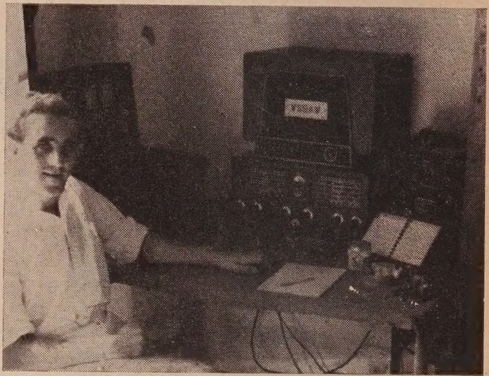
GUARDIAN ELECTRIC

1613-F W. WALNUT STREET CHICAGO 12, ILLINOIS

A COMPLETE LINE OF RELAYS SERVING RADIO AMATEURS

(from page 86)

OK1HI and G3FXB . . . **W3AS** received Cuban WACO certificate No. 75. George says this is a very pretty job and bears a hand-painted Cuban flag. CO6OK advises that only nine W Hams have received this certificate, W2QHH, W9KA, W8AJW, W3OP, W4RNA, W3DKT, W5ISF, W5ESQ and W3AS. Oscar thinks many more must have the qualifications for this award as set forth in May 1952 **CQ** . . . QSL's from **MP4BBD** were received at W5KUJ, W5MPG and W5DMR . . . **KV4BB** knocked off 830 contacts with a multiplier of 69 in the phone contest . . . Contacts for the first half of the recent CW contest were reported as follows: KG4AF 1490, KV4AA 1080, KV4AQ 1007, TI2TG 880, VP9BF 880, KP4JE 821. This gives Burt a nice lead going into the second half . . . **W2FA** nabbed VK7AG on 3.5 Mc. while **ZK2AA** made it 106 for W4BRB and 102 for W2QHH on that band . . . **W8EKK**, keying vocally, completed a WAC on 14 Mc. in a little less than three hours with TA3AA, FF8AB, ZL1HY, DL4PU, LU4GI and W5EGK . . . **DL7BA** reports the following on 7 Mc.: DU7SV 7025 1400/1630 GMT, HS1VS 7024 1600 GMT and ZC5VS 7030 1400 GMT . . . **W8PQQ** nabbed 39 countries on 3.5 Mc., including WAC, in two and a half weeks operation on that band. Al's 7-Mc DX includes ZD2DCP, 9S4AX, VQ2JN, VQ3KIF, CR7AD, CR7LU, VP8AP, ZS9I and LU4ZI . . . **OK1MB** has a MP4BAU QSL for W3JSH . . . **W2DIW**, on 7 Mc., nabbed VK3NV, VK3FAV, SM5BLH, SM6ACO and I1ARK . . . **W2WC** swears by his ground plane antenna on 7 Mc. which reached out to grab such as CR5AF, CR7AD, VQ2JN, ZS9I, ZD2DCP, 9S4AX and IT1AGA. Frank also nabbed ZS3K and ZL1CI on eighty . . . **W1DHO** says W1NKB deserves a big hand for working WAC, and plenty of other stuff on 7 Mc., with an input of 35 watts . . . **W5AVF** pulled in ST2AR and LU3ZO.



The only Ham in a new Country is always a very popular fellow. Here we see H. J. (Jack) Wheeler who put the Sultanate of Oman on the map with VS9AW. Jack ran one hundred watts input to an 813 using phone and CW. Modulation was supplied by a pair of 807's in AB2. Jack is now back in England but in his place we have VS9AS using the same rig.

Last Minute Flashes

W5MIS reports **NE1NMC** is active in Nepal! This station is operated by W6NMC. He is, apparently on phone, below 14200 kc. Confirming this, NE1NMC was heard by G3GUM on 14148 A3 at 1600 GMT Mar. 14th. Nepal is in Zone 22.

We are happy to say that our efforts to have Ruanda Urundi, OQ0, recognized as a separate country are bearing fruit. The UBA of Belgium, which was unfavorable to this, has now reversed its decision and an official statement to this effect is expected shortly. (Thanks to ON4QF and ON4AU.)

I1AHR will make weekly visits to San Marino for the next few months and will be on each Saturday PM signing 9A2A. The frequency will be 14300 kc. phone only.

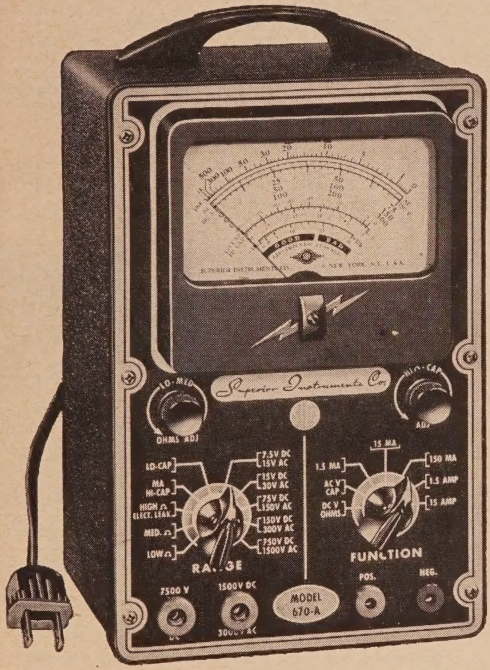
G3AAM advises that ZS8MK has persuaded **ZS8D** to put

(Continued on page 90)

Superior's New Model 670-A

SUPER-METER

A COMBINATION VOLT-OHM MILLIAMMETER PLUS CAPACITY REACTANCE INDUCTANCE AND DECIBEL MEASUREMENTS


Superior Instruments Co.
LO-MED
HI-CAP
OHMS ADJ
ADJ
LO-CAP
MA HI-CAP
HIGH Ω ELECT. LEAK
MED. Ω
LOW Ω
7.5V DC 15V AC
15V DC 30V AC
75V DC 150V AC
150V DC 300V AC
750V DC 1500V AC
RANGE
1.5 MA
15 MA
150 MA
AC V CAP
DC V OHMS
1.5 AMP
15 AMP
FUNCTION
POS.
NEG.
7500 V
1500V DC
3000V AC
MODEL 670-A

SPECIFICATIONS:

D.C. VOLTS: 0 to 7.5/15/75/150/750/1,500/7,500 Volts.

A.C. VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts.

OUTPUT VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts.

D.C. CURRENT: 0 to 1.5/15/150 Ma. 0 to 1.5/15 Amperes.

RESISTANCE: 0 to 1,000/100,000 Ohms. 0 to 10 Megohms.

CAPACITY: .001 to 1 Mfd. 1 to 50 Mfd. (Quality test for electrolytics.)

REACTANCE: 50 to 2,500 Ohms, 2,500 Ohms to 2.5 Megohms.

INDUCTANCE: .15 to 7 Henries 7 to 7,000 Henries.

DECIBELS: —6 to +18 +14 to +38 +34 to +58

ADDED FEATURE: The Model 670-A includes a special GOOD-BAD scale for checking the quality of electrolytic condensers at a test potential of 150 volts.

SOLD ON EASY PAYMENTS AT THE NET CASH PRICE

NO INTEREST OR CARRYING CHARGES ADDED

The Model 670-A comes housed in a rugged, crackle-finished steel cabinet complete with test leads and operating instructions. Size 6¼"x 9½"x4½". **$28.40 NET**

MOSS ELECTRONIC DISTRIBUTING CO., INC.
Dept B-58, 38 Murray Street, New York 7, N. Y.

Please rush 1 Model 670-A SUPER METER. I am enclosing the down payment of $7.40 and agree to pay balance, $3.50 per month for 6 months.

Name..
Address..
City..Zone..............
State..

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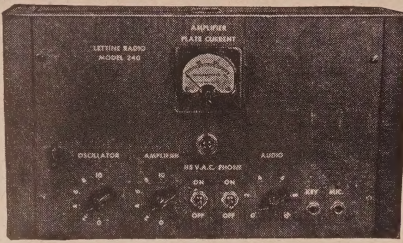

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TRANSMITTER WITH MOBILE CONNECTIONS AND A.C. POWER SUPPLY

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The 240 is a 40 to 50 watt Phone-CW rig for 160 to 10 meters, complete with: (8 x 14 x 8) cabinet, self contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters. Tubes: 6V6 osc., 807 final, 6SJ7 crystal mike amp., 6N7 phase inverter, 2 6L6's mod., 5U4G rect. Weight 30 lbs. TVI instructions included. 90 day guarantee. Price **$79.95**.

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80, 20, 10 meter coils $2.91 per set. 160 meter coils $3.60

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Vesto Towers are available in a wide range of sizes to meet requirements of amateurs and commercial users alike. Note the low prices for these quality lifetime towers: 22'-$104, 28'-$127, 33'-$149, 39'-$182, 44'-$208, 50'-$239, 61'-$299, 100'-$1,260.

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WRITE TODAY FOR COMPLETE FREE INFORMATION AND PHOTOGRAPHS

VESTO CO., Inc.
20th and Clay
North Kansas City, Mo.

(from page 88)

up a rhombic. Doc, ZS8MK, plans VQ1 operation upon his return from England next October.

New Award

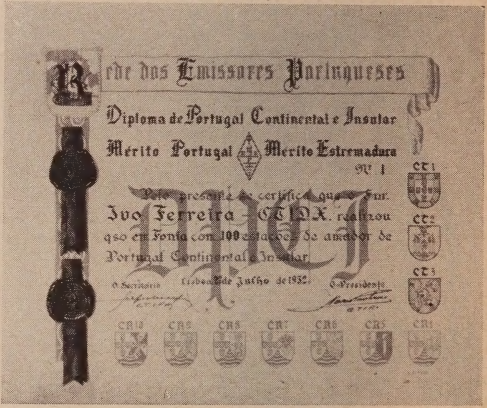
Commemorating its twenty-fifth anniversary the R.E.P. (Rede dos Emissores Portugueses) Travessa Nova de S. Domingos, 34, Lisbon, Portugal, wishes to announce its D.P.C.I. (Insular and Continental Portugal Award). This will be given upon confirmation of fifty contacts with the following Portuguese continental provinces, Azores and Madeira. The minimum contacts for each province being as follows:

1.	TRAS-OS-MONTES E ALTO DOURO	1
2.	MINHO	1
3.	DUORO LITORAL	5
4.	BEIRA LITORAL	1
5.	BEIRA BAIXA	1
6.	BEIRA ALTA	1
7.	ESTREMADURA	10
8.	RIBATEJO	1
9.	ALTO ALENTEJO	1
10.	BAIXO ALENTEJO	1
11.	ALGARVE	1
12.	AZORES ISLANDS	1
13.	MADEIRA ISLANDS	1

QSL's need not be sent if a list is submitted countersigned by the Secretary of the applicant's radio club. Contacts count dating after January 1, 1952 only.

160 Meters

A resume of top band activity, thanks to W1BB's very complete reports, show that this season has been a fairly good one with DX activity on the increase. It is hoped that the tests next year will include the month of March as conditions during this month appeared to have been even better than earlier months.



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Nº 1

Ivo Ferreira

O Secretario

O Presidente

CT1

CT2

CT3

The new DPCI Certificate. See text for details.

W1LYV was first to get across the pond on Nov. 9th working G6BQ, GRHYG, G3GGN and GW3FSP . . . **W9PNE** was the first W9 to contact England by working G5RI . . . **W5ENE** was the first W5 to do the trick when Ben nabbed G5JU on Jan. 4th . . . **W1BB** and **OH3NY** got together on Jan. 11th for the first W/OH QSO . . . W3EIS, W2EQS, W9PNE, W9NH, W0NWX and W1BB were all heard by **ZL1AH** . . . **W1BB's** signals were reported by ZS3K . . . **EI9J** made many happy with his first appearance on 160 . . . W3EIS and W1BB worked G3PU on phone!

VP4LZ was active on 1982 kc. **VE1EA** worked ZC4XP on March 1st for his 2nd Asian! ZC4XP was an amazing RST 569 and gave Clarry 339. Time 0415 GMT . . . **W1BB** turned the trick on March 8th by snagging **ZC4XP** at 0345 GMT for the first W/Asia QSO . . . **W9NH** has just completed what is probably the first WAS on 160. Nice going Sam . . . From G6QB we see that **G3DVQ** has worked OK1KKU, HB9CM and OH3NY . . . **HB9CM** was heard working HA5BT . . . Others active on 160 have been MF2AG, DL2RO, OH7OH, OK3MR and CN2AN . . . One of the best nights at KV4AA occurred on March 6th (contest) when W3EIS, W2EQS, W8BKH, W9NH, W5MET, VE2WW, W4BRB, W1LYV, W4KFC, W5ENE, W9PNE, W0NWX and W8PQQ were worked, with reports from S6 to S9 on both sides. At 0800, W7DV was heard S6, with W6AM coming in S6 at 0930 GMT. Other 'locals' pounding in were KV4AQ, KG4AF and VP9BF . . . A surprise report comes from VS9AW who advises that he had been very active on 160 and managed to carry out several successful tests with VS1EV, VS1ES, VS7WA, VS7EA and MP4HBK. John was also heard by PY1AQT, who reported him 59!! Input was 85 watts. With the end of this (160) season at hand, we hope these reports will stimulate others to get up on this band and share in the fun.

21 Megacycles

Conditions have been rather low on this band for a spell with the first fair opening showing up, very conveniently, on March 8th during the contest when the Europeans got across for a couple of hours. As activity was high at this time it is felt that previous openings may have been missed due to the fact that nobody has been on to take advantage of them.

W4LZF nabbed 20 countries during the first half while YN1AA made it No. 54 for W0HVN and No. 47 for KV4AA. W1BUX added an XE to go to 58 while W3AYS stands at 54 with the addition of CP1BX, EL2P, OZ2PA and ON4NC.

New 21 Mc. Standings

W4COK/W2COK	66	G2BJY	55	G6QB	51
G3GUM	64	G2VD	55	G8KP	50
G6GN	62	DL7AA	54	KP4KD	50
DL7AP	59	W0HVN	54	W2WZ	50
W1BUX	58	W1RY	54	W6VX	48
		DL3BJ	53		
		G5BZ	51		

Here and There

VS9AW advises that the Zone 21 boys meet each day at 1200 GMT on 14121 kc. Participants include MP4BHK, EQ3AL, YI2AM, YI2FD, VS7GV, SU5EB and usually a few VK's. Anyone else wishing to join in is welcome . . . We see that Fletcher's Ice Island, which drifts two and a half miles a day, has drifted out of the scope of the Alaskan Air Command and now comes under the jurisdiction of the Northeast Air Command. If this island should continue its eastward creep it might wind up in a Soviet area where many might be startled to hear CQ de KF3AA/UA0 . . . G3DWI is ex-ZL1ABI . . . W4EVX is now active after a tour of duty at JA2KW. Master Sgt. Martin of JA2MB/JA2KW is now back in San Diego. Capt. Goss, ex-XU8NR, Tsingtao, now ops at 2KW . . . **CP1BX** was scheduled to visit Balboa, C.Z. on March 1st . . . **EL2R** runs an ART-13 xmtr and BC348 receiver in Harbel, Liberia. Antenna is a Vee Beam on the States. See QTH's . . . Bob, W9NN, says some of the voices heard on 7-Mc phone don't fit the husky CW sigs put out by same. Something like those European locomotives I guess . . . ZC6UNJ runs 150 watts on the high or low end of the 14-Mc band and promises QSL's for all those received. If any are missing let him know. See QTH's . . . G8KP seeks QTH of W6WVJ/KW6 of '49 . . . Don Wallace spent two very enjoyable days with the FCC in Washington and had lengthy conversations with Commissioners Hyde and Sterling and Mr. Grenfell. The last mentioned is head of the Amateur Department. On his return W6AM was assisted by W6HX, W6BXL, W6CUF, W6KPC and W6QMC in the phone contest . . . KV4AA received visits from (old NU) 3BME, W1QYN, W1TNX, W1WAQ, W2FYS and W6DFY. W6DFY operated the first half of the contest from W6DFY/KP4 and rolled up over 400 contacts with 35 watts. Heard during the session was W6DFY/KP4 working W6DFY!! George will cover the second half from the home station . . . VE8RY is now **VE3DCQ**. See QTH's . . . W3MAL is now W8LAU . . . **ZL1MP** visited TI2TG and departed on a leisurely

Honor Roll Endorsements

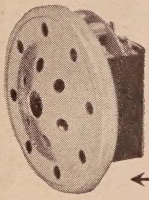
W1FH	40-253	W6ZZ	35-126
LU6DJX	40-234	W4AIX	29-83
G8IG	40-204	PHONE ONLY	
W2BJ	39-200	VQ4ERR	39-220
W9HUZ	39-194	G8IG	39-175
GM3CSM	39-190	W6AM	38-167
W3FYS	38-172	W1MCW	36-200
W2SHZ	38-172	GM2DBX	36-160
OE1FF	37-142	W5ASG	35-170
W1RAN	35-141	W0NCG	35-150

Last complete HONOR ROLL appeared in the January issue.
Next complete HONOR ROLL will appear in the June issue.

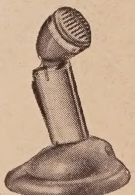
For Every Microphone Need in Two-Way Radio
SHURE
Has a "Field-Proved" Model

• Here is the world's most popular fixed-station all-purpose microphone. Outstanding because of its high speech intelligibility, extended frequency range, high output and reduction of feedback. Prevents the transmission of distracting station noises.
Model 55s
"Small Unidyne"
Ultra-Cardioid
Dynamic Microphone
List Price $72.50

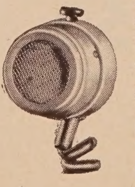
• This is the original "old faithful" mobile hand microphone. Used for rugged field and car duty more than all other makes combined! Features high speech intelligibility and ruggedness. Stands up under heavy use and abuse.
The "100 Series" Carbon Hand-Held Mobile Microphone
List Prices from $27.50



• This Controlled Reluctance Microphone Cartridge is an ideal service replacement for the Model 520SL Dispatcher and for use in special hidden microphone applications. Practically unaffected by heat and humidity.
Model R5
"Controlled Reluctance"
Microphone Cartridge
List Price $10.00



• This dispatching unit handles the most severe field requirements of paging and dispatching systems. Supplied with 2-conductor shielded cable, and wired to operate both microphone and relay circuits. Features "Grip-to-Talk, Slide-to-Lock" long-life switch.
Model 520SL "Dispatcher" Complete Dispatching Unit
List Price $35.00



• Designed for use with small portable and mobile transmitters. Only 2" in diameter and 1⅛" thick. Has 3-conductor coiled cord, metal-spring strain relief, and Push-to-Talk switch. Has same operating characteristics as "100 Series" Carbon Microphones.
Model 115 Carbon "Pack" Microphone
List Price $28.50

• A Controlled Reluctance Microphone and desk stand assembly—ideal for mobile and fixed-station use in all types of communications work. Has a built-in switch for controlling both the microphone circuit and an external relay or control circuit.
Model 510MD "Controlled Reluctance" Microphone Assembly
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MOTOROLA P-69-13 or 18-ARS receiver with special noise limiter for use with any converter having 1440-3000 K.C. $60.00

100/96" Master Mobile Whip Antenna $5.25

132S Master Mobile Stainless Steel Spring — Double Tapered $10.75

New Gon-set Tri-Band Spread Converter $47.60

Gonset "Super 6" Converter $52.50

P-327-E Fire wall loud speaker $7.50

The above comes complete with all necessary accessories and mounting hardware. Order direct or through the Motorola National Service Organization member in your area.
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Above units subject to State and Federal Excise Tax where it applies.

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Telephone—Taylor 9-2200 Ext. 161

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drive to Warm Springs Ga. ZL1MP carrys a 20 watt transmitter and was given the call of TI2XRU in San Jose . . . **W2SHZ/KZ5HE** thinks well of the Atlantic end of KZ5 as a DX gathering spot. It took Eddy a year to run up 149 countries in the Zone, while he spent the next five amassing a total of 169 at **W2SHZ** . . . ZK1BC is now **ZL1DF**, Bob hasn't been able to get on the air yet due to housing troubles . . . Ex-W6WKU, Dewitt, is now active at **W9WKU** . . . W9FID welcomed QSL from VS9AW.

Latest QSL Addresses

CN8MY ex-HZ1MY etc.	G. R. McKercher, c/o Steers-Grove, FPO 214, PM, NYC.
Cuban QSL Bureau	P.O. Box 136, Santa Clara, Cuba.
EL2R	Henry Greenville, USPHS, Box 34, Harbel, Liberia.
G3GUK ex-VS9AW	H. J. Wheeler, 25, Culverden Ave., Turnbridge Wells. Kent, England.
KZ5GR	Glenn Heath, 5700 Maint. Sqdn. Albrook AFB. Canal Zone.
KZ5PA	Cross-Roads Amateur Radio Club, Box 1713, Cristobal, C.Z.
LU5HAQ	Carlos Musio, Santa Ana 2908, Cordoba, Argentina.
VE3CDQ ex-VE8RY	Jack Smith, RR1, Billings Bridge, Ont. Canada.
W.A.E. Certificate	DL7AA, DARC, Berlin-Rudow, Fuschsienweg 51, Germany.
ZC6UNJ	Lt. Co. W. T. McAninch, UN Military Observer Group, APO 206-B, PM, N.Y.
ZD1C	VIA ZD1FB.
ZD4BK	P.O. Box 154, Takoradi, Gold Coast, Africa.

Thanks to: W3AS, W3TM, W4ZAE, W6AM and DL7AA.

12-VOLT DYNAMOTOR

(from page 51)

larger dynamotor is used, inductive surges caused by pushing the push-to-talk switch and releasing it before the dynamotor starts may damage the contacts of the series/parallel relay. In this case, it might be a good idea to use a toggle switch for push-to-talk. A toggle switch cannot normally be operated on and off so fast that the inductive surge will be excessive.

The wiring shown in heavy lines in *Fig. 1* should be at least B&S No. 8 to keep voltage drop to a minimum. The author used two lengths of paralleled No. 8 wire for each lead to the extra battery in the trunk. The extra wire was probably not absolutely necessary, but it was obtained surplus and cost very little.

The dynamotor and relays are mounted on a 7" x 11" x 2" chassis. All connections to these components are made from a screw-type terminal strip on the side of the chassis.

The investment in relays, chassis, and wire was about $11.00. The extra battery was second-hand and cost $7.00 at an automobile wrecking company. The total investment was probably less than the cost of any surplus 6-volt dynamotor.

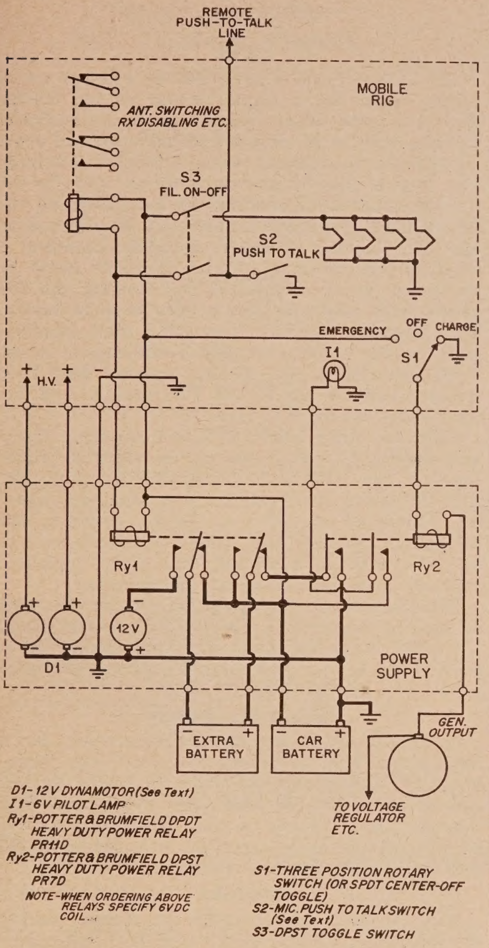

REMOTE PUSH-TO-TALK LINE
MOBILE RIG
ANT. SWITCHING RX DISABLING ETC.
S3 FIL. ON-OFF
S2 PUSH TO TALK
EMERGENCY
OFF
CHARGE
I1
S1
+ H.V. + −
Ry1
Ry2
12V
D1
POWER SUPPLY
EXTRA BATTERY
CAR BATTERY
GEN. OUTPUT
TO VOLTAGE REGULATOR ETC.
D1-12 V DYNAMOTOR (See Text)
I1-6 V PILOT LAMP
Ry1-POTTER & BRUMFIELD DPDT HEAVY DUTY POWER RELAY PR11D
Ry2-POTTER & BRUMFIELD DPST HEAVY DUTY POWER RELAY PR7D
NOTE-WHEN ORDERING ABOVE RELAYS SPECIFY 6VDC COIL.
S1-THREE POSITION ROTARY SWITCH (OR SPDT CENTER-OFF TOGGLE)
S2-MIC. PUSH TO TALK SWITCH (See Text)
S3-DPST TOGGLE SWITCH

Fig. 1. Wiring schematic of the 12-volt dynamotor switching circuit used by W0MCB.

NOVICE SHACK

(from page 70)

chassis with the kit. He replied that they had been offered for an additional charge of $5.00, with no takers. He did not say if this offer still held good.

Testing The Transmitter

First operation of the transmitter was on the 3.7-Mc Novice band, using a ½-wave doublet antenna. I made six or seven contacts, getting excellent reports. Transferring operations to 7 Mc., using another ½-wave doublet, results were the same—T9X note and excellent keying.

These reports verified what I was hearing in my monitor. They speak well for the keying characteristics of the oscillator circuit and the crystals supplied with the kit. The three samples supplied all keyed equally well.

(Continued on next page)

Please Pardon Us if we Continue to Brag . . .

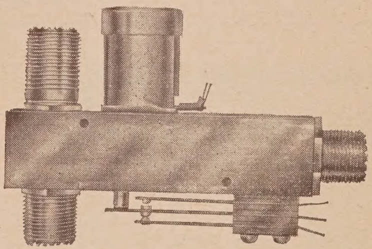
about the improvements in our coaxial relay and the satisfaction they are now giving in thousands of installations. Increased contact pressure to 40 grams, both energized and on receiver contact has made our exclusive receiver protecting device 100% effective.

This new and improved receiver connector automatically grounds the receiver contact point inside the connector housing, when the relay tongue moves to transmit side, eliminating loss of r.f. to the receiver circuit during transmissions.

If you are joining the Mobile Parade, you need not be concerned about the trend to 12 volts on new cars. You can install a 6-volt *Dow* coaxial relay, and at anytime during the life of the relay, we will change it to any other voltage for a handling charge of one dollar.

In considering a coaxial relay for your home set, a 110 v AC *Dow* relay will entirely eliminate all trace of hum or chatter. Our AC types are guaranteed to be just as quiet as DC. AC types are now entirely sealed and are guaranteed to maintain absolute silent operation permanently.

With reasonable s.w.r. *Dow* relays will handle 1000 watts without deterioration.



DC—6, 12, 18, 24, 32 volts $9.50
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AC 1 All standard voltages 6 to 110 $10.50
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Amateur net Type DKC-E
Add $1.00 for receiver grounding connector
Amateur net Type DKC-G
Add $2.00 for both above accessories
Amateur net Type DKC-GE

When ordering specify voltage and type—also state whether for 52 or 72-ohm line.

Did you know that you could try out a semi-automatic *Dow-key* on your own rig on a money-back basis?—write us for circular.

If your dealer has not stocked semi-automatic *Dow-keys*, which list at *$16.75*, or coaxial relays, order direct from factory—all prices FOB Warren, Minn., immediate shipment.

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Contains three plastic-cased removable 2 volt cells, with built-in hydrometers, all in super-strong case with windows for cell readings. Two cases may be snap-clasped together for 12 volt or parallel 6 volt assembly. 6 volts, 20 AH. 5"x11"x6½" high, weight only 15 lbs! Uses standard electrolyte.
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CONTROL BOXES

REMOTE CONTROL RECEIVER BOX. Crank drive, dial may be recalibrated to your frequencies. Has audio control. 3¼"x4" x1¼" deep. Complete with plug.
EXCELLENT USED......................**Only $2.95**
FLEX SHAFT for above:
Appx. 10'—$2.50, Appx. 14'—$3.00

CHANNEL SELECTOR BOX—Has four channel transmitter selector switch, with room for extra switches, controls, etc. 2¾" x4"x2" deep. Complete with plug.......**EXC. USED $2.50**

PE-103 DYNAMOTOR. A standard for heavy duty mobile use. 6 or 12 volts in; 500 volts, .16 amps. out. Complete with filter base and power input cables...........**EXC. $24.50**
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PE-101-C DYNAMOTORS. New, while they last.....**$4.95**

6 V VIBRATOR TRANSFORMER. Non sync, two outputs: 700 VCT, 145 ma for plates, 15 v for bias. Using 5U4G can deliver 320 V at 130 ma................**NEW $1.89**
With 6 V vibrator $2.89

12V FILAMENT XFORMER or line voltage booster PRI: 110 v 60 cy.; SEC: 9 to 13 volts in 1 volt steps at 3 A, Free schematic shows many uses.............**NEW $1.89**

OUTPUT TRANSFORMER, 5000 ohms input to TWO outputs, 300 ohms or 3.5 ohms. Use as output for 12A6, 6V6, etc. or to match speaker or headset. **NEW, potted, shielded 79c**

12 CHANNEL T-V TUNER

Complete front end, famous make "Silver Circle." Furnished with original factory instructions, less tubes. Dozens of uses; receivers, converters, etc. The bargain of the year for builders, amateurs, students. These are factory rejected for minor damage...............**ONLY $1.95 each, 3 for $5.00**

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(from page 93)

TVI

The *Model-75* kit is advertised as TVI-free on all bands, except for a slight amount on ten meters. This is a pretty broad claim, because a transmitter emitting only on its design frequency can still cause interference to certain model television receivers. This type of interference can only be cured at the receiver. However, operating the transmitter on the 3.7-Mc band produced no observable interference on any TV channel. 40-meter operation produced a slight crosshatching on channel 5, which could be almost completely eliminated by detuning the 807 plate-tuning condenser just a trifle from resonance. The detuning required caused the final amplifier plate current to increase only a milliampere or so.

On both bands, the 75-ohm antenna feed lines actually laid on top of the TV receiver, and the transmitter was five feet from it.

Coils for other bands were not supplied, therefore conclusive tests could not be made on them. However, the 7-Mc tank coil would tune to 14 Mc. with the tuning condenser set near minimum capacity. Operating the 807's as 14-Mc. doublers, but without an antenna load, caused no interference to the TV receiver, indicating that direct harmonic radiation from the transmitter was quite low.

These results are quite good for a transmitter with no specific precautions against TVI, except small r-f chokes in the 807 plate leads and careful placement of the bypass condensers, in order to eliminate a v-h-f parasitic oscillation.*

Increasing Power

As already stated, the *Model 75* transmitter has a rated power input of seventy-five watts—the Novice limit. A feature that will interest many Novices looking forward to the time when they obtain their General Class licenses is that power-supply components permitting the input to be increased to 150 watts may be obtained for an additional $15.00.

Remarks

With the 807's located under the chassis, placing the transmitter directly on a flat surface will reduce air circulation around them and could result in serious overheating. A rubber mounting foot at each corner will alleviate this condition. The hot air flowing through the ventilating holes above the 807's will draw cooler air in under the edges of the chassis.

The rubber feet will also reduce the possibility of scratching the surface upon which the transmitter is placed. Nevertheless, I would still hesitate to place it on a polished wooden table without a heat-resisting pad under it, unless I wanted a blistered spot in the center of the table to draw attention away from the cigarette burns around the edges.

The *Model 75* transmitter is designed to feed a ½-wave doublet antenna fed with 75-ohm line. With other types of antennas, a link-coupled antenna tuner will probably be required. Even with a doublet, it may be difficult to obtain sufficient "loading" for full input, especially with a low antenna.

---

* These conclusions refer to the second kit supplied for test, in which the 807 stage was redesigned to eliminate a v-h-f parasitic oscillation discovered while testing the first one. Continuing tests are being conducted by the manufacturer to further reduce spurious outputs. He has reportedly eliminated the 7-Mc. TVI—Herb.

(Continued on page 94)

THE OTTAWA SIX METER STORY

Transformer Data

(Figure 2, p. 53)

T1—Input transformer, single plate to pp grids (Hammond 51)
T2—Modulation transformer, 10,000 ct to 5-8000 ohms, 2w., (Hammond 2002)

(Figure 3, p. 53)

T1—Output transformer, 10,000 ohms, to v.c. (Hammond 57)

(Figure 4, p. 54)

T1—Input transformer, single plate to pp grids, (Hammond 51)
T2—Modulation transformer, 10,000 ct to 4-6000 ohms, 3½w., (Hammond 2004)

(Figure 5, p. 54)

T1—25-Mc TV i-f transformer (RCA 206K1)

(Figure 6, p. 55)

T1, T2—10-Mc i-f transformers (Meissner 16-6665)
T3—Interstage transformer (Hammond 51)
T4—Output transformer, 10,000 ohms to v.c. (Hammond 57)

(Figure 7, p. 55)

T1—push-pull output transformer (Hammond 58)

(Figure 8, p. 56)

T1—Hammond 57

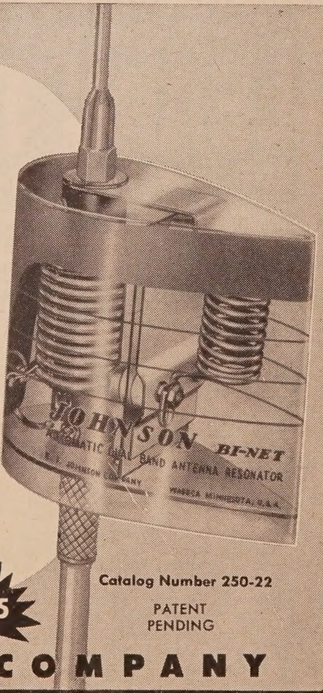
SUPER—6

(from page 42)

to the center shield of the 6BH6 socket by tying it to the nearest ground lug. This last step is only necessary with the *Super-6* and *Deluxe Tri-Band* converters as in the *Tri-Band* model lifting *pin 3* from ground does not remove the grounding strap to the center shield.

The last step depends on the converter model. On the *Super-6* the lead from the on-off switch to *pin 4* of the 6CB6 is moved over to *pin 3* of the 6AV6. This now places the filaments in series-parallel. On the *Tri-Band* and *Deluxe Tri-Band* the lead from the on-off switch to *pin 4* of the *6BH6* is moved over to *pin 3* of the same tube.

The dial light may be replaced with a 12-volt G.E. lamp #1815. *(Tri-Band users interested in 40-meter reception may easily modify their converters to tune this band if they are willing to forego 20-meter coverage. Details on this simple conversion are available directly from the Gonset Co., 801 S. Main Street, Burbank, Calif.)*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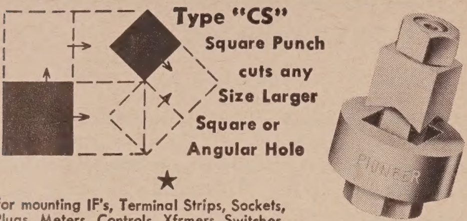

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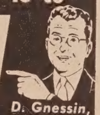
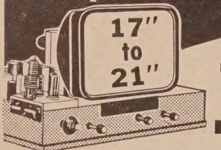


D. Gnessin, Educational Director



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(from page 94)

One way to obtain more loading is to wind a new link of well-insulated wire directly around the tank coil. Another method is to try connecting different mica condensers across the link terminals. The exact capacity must be determined by experiment. At W9EGQ, a 0.002 μfd. condenser gave full loading on 3.7 Mc. No capacity was required on 7 Mc.

The New 21-Mc. Novice Band

Effective on March 28th, the frequencies 21.1 to 21.25 Mc. were opened to Novice use. At the same time, the 27-Mc band was withdrawn from the Novice service. From the Novice viewpoint, the trade is all to the good, because the new band will be "open" considerably more than the old one.

Under the present phase of the sunspot cycle, the 21-Mc band will normally be a daytime band, and is likely to be quite erratic. On good days, signals from distances of several thousand miles should be heard with good signal strength. On other days, few signals will trickle through.

A Message To All Mobile Operators

"Dear Herb, I am writing this letter in the interest of all Hams who have mobile rigs. Just the other day, I saw a Ham driving along about fifty miles an hour, one hand on the wheel and the other holding a microphone. He just about got sideswiped by a large truck. Luckily, he did have just enough control of the car to pull out of the way.

"From this example, it can be seen how dangerous driving a car and gabbing over the air at the same time can be. I think the least they could do would be to drive at a moderate speed while doing so.

"I am fourteen years old and have taken the Novice examination. I am now waiting for my license, which I hope gets here soon."—Earle Johnson, Apt. C, 126 Penn., Forrestall Village, North Chicago, Illinois.

A ½-wave antenna for the center of the band will be 22 feet 3 inches long. Any of the standard feed systems may be used with this length. Most 7-Mc antennas will work quite well on 21 Mc., as will 3.7-Mc antennas fed with tuned feeders.

The 7-Mc. Band

The new 7-Mc band has behaved more or less as expected. Daytime and early evening signal strengths have been good, although fading has been rather severe at times. The presence of foreign shortwave broadcasting stations in the band is something of a problem in the evenings in most sections of the country; in the extreme south, they are quite annoying even in the daytime.

Unfortunately, most of these stations have a legal right to operate on these frequencies; therefore Novices will just have to make the best of them.

Speaking of 7 Mc.—as many of you have written to tell me—Fig. 3 in the March column contained an obvious error in each of the three sketches. The insulator between the antenna and the tuner should not be there.

Also, crystal frequencies between 3587.5 Kc. and 3600 Kc. double into the 7175-Kc. to 7200-Kc. Novice band. A typographical error made the first frequency read 3187.5 Kc. I doubt if it puzzled anyone more than a moment, but we should try to keep the record straight.

Letters and General News

WN9WJB suggests using a balanced antenna and a link-coupled antenna tuner between it and your communications receiver to get away from interference caused by TV receivers. He reports that it works fine and gives signals a terrific boost. He further reports, "I have had my license about two months and have worked three states with ten watts input to a 6L6. I will soon be running seventy-five watts to a pair of 6L6's (The "Old One-Two"). I'll write and tell you how it works."—Al, WN9WJB.

(Continued on page 98)

COAXIAL CABLES:

RG-8/U Coaxial Cable: 1—100 ft., **9c** per ft.; **100—500** ft., **8½c** per ft.; 500 ft. or more, **8c** per ft.

RG-34/U Coaxial Cable: 71 ohm—125 ft. **$15.00**

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TRANSMITTER BC-230—Voice Modulated Trans. with 5 Plug in Coils to cover Freq. Range 2500 to 7700 KC. With 4 Tubes: 2/10y—2/45—& RF Meter 0—1.5 Amps. Power Supply required: 6 or 12 Volt & 350 Volts. Size: 13" x 8" x 7". Schematic included **$8.95**

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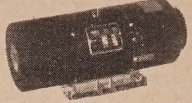

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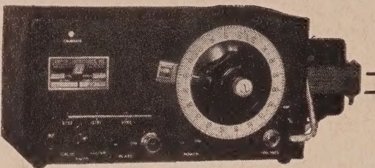

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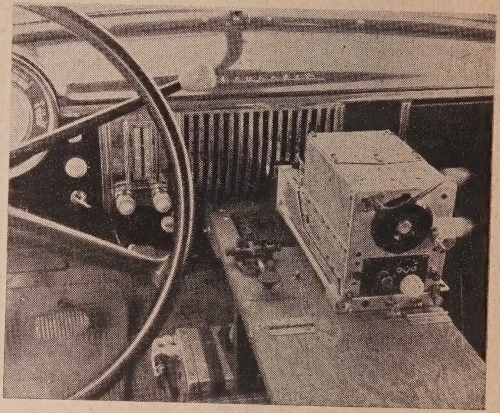
(from page 96)

WN5YSC writes, "Dear Herb, I got my ticket three days ago, on Friday, the thirteenth. Rig is a Lettine 240 and the receiver is an NC-125. Input is twenty watts and the antenna is ¼-wave long. Best DX so far is 310 miles . . . "I am fourteen and took the Novice examination the day after my birthday."—Chuck, WN5YSC.

From **WN8FFJ**: "Dear Herb, I got my license in October, but I haven't been on much. I am an engineer on diesel tug boats between Pittsburgh, Pa., and New Orleans and am away from home about sixty days at a time. I learned the code mostly from copying W1AW on a BC-454 in the engine room of the boat, with 3000 horsepower screaming in my ear . . . "My station consists of a converted BC-457, feeding a ½-wave doublet, and an SX-43 receiver. Later, I hope to try a rig on the boat . . . "I am writing on the **Motor Vessel Keystone** heading up the **Ohio** near Parkersburg, W. Va."—Len, WN8FFJ.



Novice mobile CW station, WN5YBL, operated by R. E. Wright, Roswell, New Mexico. The receiver is a BC-454 with six-volt tubes. The transmitter is also converted surplus equipment, running fifty watts input from a PE-103 dynamotor. More details in the text.

The following fellows request help in obtaning their Novice licenses. If you cannot help them personally, but know of amateur radio clubs in their areas, sending them the addresses and meeting times will probably help them. Ages are included when known.

Rich Jablonski (13), 32 Haller St., Buffalo 11, N. Y.
Dennis Popper (14), 730 Memorial Dr., S. E., Cedar Rapids, Iowa. Telephone: 39177.
Richard Wagenheim, 140 W. Orchard St., Newark, Ohio. (Thirty miles from Columbus, Ohio. Willing to go to Columbus any evening of the week for code instruction.
Joe Hussey, 415 Kossuth Street, Sidney, Ohio.
Jim MacGregor (15), 1 Adelaide Ave., Barrington, R. I.
Jim Smith (15), 628 S. Chipman, Owosso, Mich.
Al Randall (16), 1385 Campbellton Rd. S. W., Atlanta, Georgia.
Ted Turpin, 1106 So. 1st St., Marshalltown, Iowa.
Mike Baulch (17), 364 Lenox, Detroit, Mich.

W1TUL writes, "Dear Herb, I'm fourteen and in the ninth grade. I'd like to have a teen-age Ham club in the Boston area. I wonder if you could print my suggestion and ask the boys and girls to write me about it. Thanks."—Dave Yetman, W1TUL, 26 Hillside Ave., Malden 48, Mass.

KN2BTT is looking for chess players. "Dear Herb, can you help me locate some Hams to play chess with me over the radio? I operate on the 3.7-Mc Novice Band."—J. Briand, KN2BTT, Suffolk Sanatorium, Holtsville, L. I., N. Y.

WN8KJP writes, "Dear Herb, in the February column, Larry ("Moose"), W9SWN (he has his General Class license now), told about the Martinsville, Indiana, Hams. Larry is a dear friend of mine. I thought I would tell you about my station. My brother, W8INB, and I share it. It is an HQ-129X receiver and a converted BC-457A,

(Continued on page 100)

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(from page 98)

running fifty-five watts . . . "I have made contacts with over 425 stations in thirty-four states, VE1, 2, and 3, and with California seven times. 73."—Delmo, WN8KJP.

WN4YPY writes, "Dear Herb, Just a line to let those looking for North Carolina know that I am on daily from 5:30 p.m., EST. On week-ends, I am on from early morning 'til late at night (and early a.m.) . . . "The rig is a converted BC-457, with a choice of sixteen or thirty-six watts input. The antennas are a folded dipole, fifty feet high, a Vee, and a .64-wavelength centerfed antenna. Look for me on 3703.5 or 3735 Kc."—Bill, WN4YPY.

WN5YBL says, "Dear Herb, my job requires constant travelling over five states and keeps me away from home about ninety per cent of the time. For this reason, I had to go mobile . . . "The receiver is a BC-454 modified so that 3.4 to 4.1 Mc. occupies the entire dial. Also added a full-wave adjustable noise limiter as described in August, 1952, **CQ.** I changed the triode section of the 6SQ7 (originally a 12SR7) from the BFO to an audio stage and mounted a separate b-f-o tube on the rear of the set. I use a wafer switch to switch the power supply and speaker of the regular automobile receiver to the BC-454.

"The transmitter runs fifty watts to an 807. Power is supplied by a **PE-103** dynamotor. The antenna is a base-loaded "whip."

"I have made only a few contacts with my mobile installation. A few days after finishing it, I went to bed because of sickness. I am up for short periods now, but the doctor says I'll have to be in bed for two or three months; so I guess I will not operate mobile for a while."—R. E. Wright, WN5YBL.

WN3VKW writes, "Dear Herb, the first day on the air, I worked three states. One of them was WN1WRQ. I didn't get his address. Can anyone supply it? I have a Philmore NT-200 transmitter with twenty-five watts input, a 120-foot "Zepp" antenna, and a NC-125 receiver. I use a home-built receiver as a monitor . . . "I am fifteen years old, and I have a 10 w.p.m. code certificate, although I can copy faster than that now."—Terry Dietrich, WN3VKW, 320 State St., Hamburg, Pa.

Right to the point, **W6SDW** writes, "Dear Herb, I'd like to register a complaint against Hams outside the district you are calling that answer your directional CQ's. 73,"—Dan, W6SDW.

WN6SJR (W6SDW's brother) is also brief. "Dear Herb, I agree with Mike, WN6TXH, about working a lot of states with low power. Since being a Ham, I have worked only three states. My best DX is Seattle. Not only do I know Mike's problem, I also know Mike."—Lennie, WN6SJR.

Once again, we have used up our space. See you again next month. 73, **Herb.**

YL'S FREQUENCY

(from page 72)

in shifts—and when things get too crowded he goes out with his *Mobile Special* (built from the *CQ* plans in the mobile special issue last May).

YL/CC

YLRL's YL Century Certificate is off to a good start. Award No. 1 has gone to W1BFT, Carl Evans; No. 2 to W2QHH, Howy Bradley.

Results of the YL-OM Contest

Many more OM's and YL's turned out for the *YL-OM Contest* this year, and apparently all had an FB time. For the OMs, W1BFT made his fourth straight win, and since this is the third year he has won the gold loving cup, donated by W8UDA, Carl will now retain permanent possession. Among the YL's there was competition for top place, with W8HLF winning the silver cup donated by W1BFT. Last year W4SGD won top place, and the year before

(Continued on page 102)

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"Super Six Converter"

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(from page 100)

W6YYM. This year, for the first time, cups also are being given to the top OM and YL scorers for phone-to-phone and CW-to-CW contacts. So cups will be awarded as follows:

1st — YL — W8HLF
OM — W1BFT

2nd — YL phone — W8HLF   YL CW — W1FTJ
OM phone — W1BFT   OM CW — W8AJW

3rd — YL phone — W4SGD   YL CW — W9JUJ
OM phone — W8AJW   OM CW — W1BFT

Here are the scores of those reporting in the contest. Others submitted logs for confirmation only.

Station YL	*Aggregate Score*	*Phone-to Phone Score*	*CW-to-CW Score*
W8HLF	169440	166560	240
W4SGD	157500	156660	30
W4KYI	152650	152650	
W0CXC	102080	102080	
W1YYM	79980		
W1FTJ	68080	10	68080
W4STH	64050	64050	
W9JUJ	63040	2940	47120
W3MAX-OQF	58500	58240	20
W4UNO	45210		
W1QON	33600		
W1ULF	28750		
VE3AJR	26190		26190
W8HWX	25750		
W3QPJ	22680	120	21600
VE1ABT	21000		21000
W2JZX	19760	19760	
W5SPV	18040	18040	
W1TUD	17080	17080	
W1BCU	16320	16320	
W2WCL	14250		
W3RXV	13860	13720	10
W3NHI	12540		12540
VE3DEX	12040	12040	
W9MYC*	10500		10500
W1RLQ		10440	880
W5WUX	7840	7840	
W1OAK	7140		7140
W4TIE	6720		6720
W3SVY	5950		5950
W1SRQ	5600		5600
W8HUX	5460	5460	
W2EEO	5170	5170	
W6EHA-5	4790	4790	
W4UTO	3840	880	1680
W9RXY	3750		3750
W9JTX	3360		3360
W9OMZ	2600	10	2280
W1LYR	2280		2280
W2IQP	2000		
W1VXC	1820	1820	
W9PEX*	1360	1360	
W3LSX	990		990
W5RZJ	770		
W3MSU*	770		770
W3CDQ	250		250

Station -OM-	*Aggregate Score*	*Phone-to-Phone Score*	*CW-to-CW Score*
W1BFT	11440	4250	4080
W8AJW	8880	3150	4140
W2BBK	7560	1870	2850
W8SDD	5000	720	2560
W2OIB	4860		
W4NTT	3840		3520
W4ARR	4560		
W3AS	3520		
W8YGR	3520		
W4OMW	3570		
W2NIY	3360		
W4KL	2800		
W1AW	2660		
W9CMC	2660		
W8AQ	2520		2520
W3SSP	2380		2380
W3LXE		1170	2520
W1BFB	2160	2160	
W4KX	1920		1920

(Continued on page 104)

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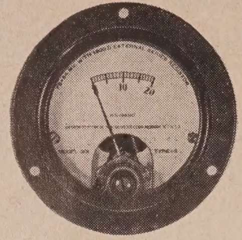

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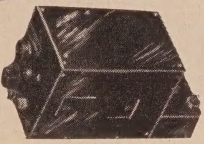

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- Ideal for use at CD auxiliary listening posts.
- May be used for fixed station operation.
- May be used as fixed preselector to increase sensitivity and improve image rejection of communications receivers.
- Includes provision for AVC to reduce overloading by strong local signals.
- Chassis size only 4" x 2⅛" x 1⅝".
- Uses two tubes, 6BH6, 6U8.
- Power requirements—6 v. at .75 a., 150 to 250 v. at 15-25 ma.
- May be used with 12-volt systems.
- Available for 10, 15, 20, 40 and 75-meter bands.

CVT UNITS IN KIT FORM—Complete with all parts including punched chassis, tubes, instructions with pictorial wiring diagrams and installation details. Price $12.50. Wired and tested to order extra. Please specify band desired by CVT-10, CVT-15, etc.

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TNS-1 IN KIT FORM complete with all parts including punched chassis, matched tubes, instructions with pictorial wiring diagrams and installation details. Price $7.95.

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(from page 102)

Station YL	Aggregate Score	Phone-to Phone Score	CW-to-CW Score
W8FRD	1920		1920
W3BET	1870	1870	
W3QLW	1800		
W3HJT	1800	1800	
W3FYS	1560		1560
W4HUW	1500	1500	
VE3ATR	1320		1320
W1JYH	1260	1260	
W3CDG	1100		1100
W4KMS	990	990	
W8DAE	810		810
W2UAP	800		800
W8RAB	630	630	
W0IHW	490		
W8FYE	480	480	
W3QDI	480	480	
W0YQR	420	420	
VE1OM	420		420
W4JLK	420		420
W9MBL	360		360
W2NZE	320	320	
W4WRH	300		
W0FEO-0	300		300
W4TIZ	160		160
W8CHG	160		160
W9FDX	160		160
W1BVR	120	120	
W4IOW	120		
W2CCA	40	40	
W0HAW	40		40

9th District Convention

The third annual convention for YL's in the 9th call area is being held on May 22-23 at Mishawaka, Indiana. Plans call for the YL's to check in on Friday, the 22nd, at the Mishawaka Hotel, where special rates will be given to all YL conventioneers. A transmitter hunt is scheduled for that day, and it is suggested that all YL's planning to attend who have mobile gear make provision to operate on 29620 kc. There will be open house in the evening. Saturday a.m. calls for a tour of South Bend and vicinity, including a trip to Notre Dame University. This will be followed by luncheon at the Club Normandy, and, at 1:30 p.m., a lecture and demonstration of SSB by W9OHM. OM's accompanying the YL's will be welcome at all these events. The period from 4 to 8 p.m., however, will be for YL's only, with a meeting and banquet at the Club Normandy. A dance will start at 8:30 p.m., music to be furnished by the "Mobilairs," an orchestra composed entirely of members of the Mobile Amateur Radio Club of South Bend. Any and all Hams are invited to attend the dance. The YL's of the 9th district extend an invitation to all licensed YL operators from other districts to attend their convention. There will be a registration fee of $1.00. For further information contact the chairman of the convention, W9LRT, Julia Morgan, 138 Monmore Ave., Mishawaka, Ind.

Los Angeles YL Club

On February 14th the **YL Club of Los Angeles** held its first dinner meeting with OM's of the members attending. It was a tremendous success, with over fifty present. Johnny Griggs, W6KW, Southwestern Division Director, was guest speaker. Those attending: W6NLM, CPU, PJU, ZE, KW and XYL, KER, MES, CQV, VBN, N6PCO, QJW, WRT, UTZ, AVF and guest, RBG and OM, GKJ, GKH, CEE, HWM, NMY, OAQ, WSV, WSW, AVE, VGO, WQK, VRC, MFP, ex-1VC, 6NZP and OM, RWM, HJG, LBO, EJL, SBZ and XYL, KYZ, IQU, JCA, NSH, 7RHF/6, 7OBN/6, 6JZA, GRW, TPE and XYL (awaiting her call).

Here and There

New QTH for YLRL vice president **W3JSH** is Dottie Wickenhiser, 8 Chelsea Rd., White Plains, N.Y. . . . **W0RAW**, Bertha, reports a YL "Babble Net" in South Texas. It meets at 9 a.m. every Tuesday morning on 3830 kc. W5NWR, Velma, is NC. . . . **W6ONK** proudly informs us that his XYL is now **KN6AHA**—after sweating it out for three months. Russ has been on active duty with the Navy and he and Bonnie were hoping they could have some QSOs, but her ticket arrived just four days before his discharge. But they are both happy over her call, and she still wanted him to be her first contact.

33 es CUL—W5RZJ

CONVERTER - ETTES

(from page 40)

also provides a choice of using either the normal broadcast antenna or the transmitting antenna on the *Converter-ette.* In addition, the heater supply for the *Converter-ette* is connected through to the latter whenever the switch is placed in one of the h-f positions.

It will be seen that the broadcast antenna line is broken at two points through switches *B* and *C*. This, together with the separate switch decks, eliminates any possible leakage of broadcast signals which otherwise might creep in.

If, when power for the *Converter-ette* is obtained from the b-c set power supply, it is found that feedback or motorboating occurs when a h-f signal is tuned in, a decoupling filter should be installed. This may be done at the b-c set, and the filter should consist of a 1-watt 2000-ohm resistor in series with the B-plus lead to the *Converter-ette,* with an 8-μfd electrolytic capacitor connected between ground and the *Converter-ette* side of the resistor.

In certain cases the output from the *Converter-ette* may be too high to prevent overloading or excessive a-v-c action of the b-c set. This may be reduced by padding down the output of the *Converter-ette* by means of a resistor connected between the output side of *C6* and ground. The resistor will vary in individual cases, ranging from 100 to 3000 ohms. To find the correct value, set the volume control slightly above normal operating level, and disconnect the antenna from the *Converter-ette.* Then try different size resistors until the one is found which drops the thermal noise down to where it can just be heard slightly.

If the *Converter-ette* is to be used for fixed station operation, the same procedure is used for padding down its output. In some cases it will be better to pad it to the point where the *Converter-ette* noise may be heard just above the receiver noise, or to the point where it starts to read on the *S*-meter. With the usual communications receiver, shielding may not be sufficient on the broadcast band to prevent leakage from broadcast stations. Unfortunately, little can be done to alter this situation, except to use one of the higher frequency bands of the set as the variable i-f system. Here it will be necessary to lower the *Converter-ette* h-f oscillator frequency accordingly.

If the *Converter-ette* is to be used as an r-f amplifier and pre-selector for a communications receiver, it will be necessary to either detune or disable the *Converter-ette* h-f oscillator to prevent overloading of the receiver. The *Converter-ette* terminals of the set through a shielded line, and the output level should be padded down as described above.

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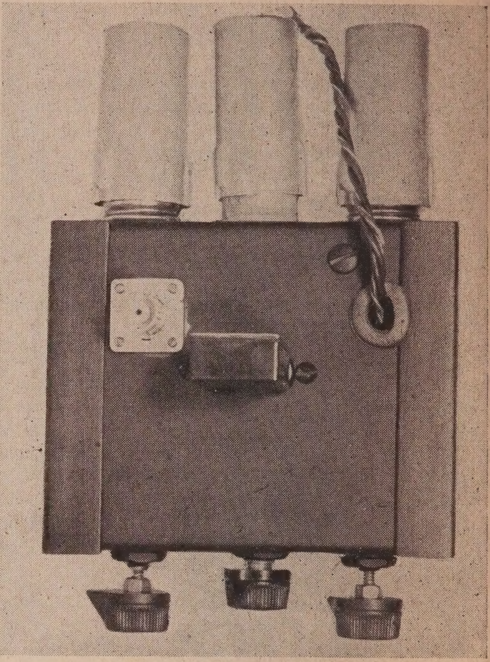
DIAL-LESS VFO

(from page 33)



Bottom view of the dial-less v.f.o. The crystal is not wired into the circuit as it is only used for calibration purposes. The coaxial output was necessary in the authors installation. The leads passing through the hole at the upper right are the power leads. Generally there is enough stray coupling between the v.f.o. and the converter to permit the operator to "spot" his frequency.

over relay to provide this coupling to the v-f-o output.

Although link coupling, of necessity, had to be used in this particular installation, high impedance coupling can be used to good advantage. Because of the unit's small size, it can be bolted to the side or bottom of an under-the-dash mobile rig. A wire can then be run directly from the plate of the 6AK6 buffer amplifier through a 100 μμfd. capacitor to the grid pin of the crystal oscillator socket on the mobile rig. Since the lead length will be short, the losses will be quite small. Otherwise, a co-ax line must be run from the v.f.o. into a link in the rig itself which in turn is coupled to another tuned circuit. Obviously, this complicates things with the addition of another tuning control, and, for this reason, is not as desirable.

Needless to say, the unit can be also used for fixed station installations. Or, perhaps it will find use in that new compact portable rig you've been planning. In any event, the principles involved, i.e. a "dial-less" v.f.o. will surely provide you with a key to smaller mobile equipment.

Armed Forces Day RTTY Message

As a new feature of Armed Forces Day, Saturday, May 16, 1953, the Navy will broadcast a special message from the Secretary of Defense on RTTY. Amateurs who submit copies of this broadcast will be given letters of acknowledgment. Transmission will utilize the amateur teletype standards and will be sent on the following schedule:

Time	Call Sign	Frequency
1300 EST	NDC (Norfolk, Va.)	7375 kc
1300 CST	NDS (Great Lakes, Ill.)	7375 kc
1300 MST	NDF or NDW2 (New Orleans, La.)	7375 kc
1300 PST	NDW (Treasure Island, Cal.)	7375 kc

Each transmission will commence with a period of ten minutes of test and station identification to permit amateurs to adjust their equipment. At the end of the test period, the message from the Secretary of Defense will be transmitted. It is not necessary to copy more than one station and no extra credit will be given for so doing. The message should be submitted "as received." No attempt should be made to correct possible transmission errors. Copies should be mailed to Armed Forces Day Contest, Room BE-1000, The Pentagon, Washington 25, D.C. Time and call letters of the station copied should be indicated as well as the name and call sign of the amateur concerned.

MOBILE ON 160

(from page 23)

pilot bulb as an output indicator.

Inserting the finished coil into the antenna assembly between the shock-absorbing spring and the whip proper, I grounded the antenna input terminal to the frame of the car and resonated the antenna to my most-used crystal frequency, with the aid of a grid-dip meter, by removing turns from the coil. The method of doing this has been described many times in the past; therefore the description will not be repeated here.

This completed the antenna installation. In operation, the coupling is adjusted for an input of twenty watts. The pilot light coupled to the bottom of the coil glows when the transmitter is on. It can be seen in the rear-view mirror, thereby giving visual proof that I am actually on the air. (*Although W0RRJ does not mention it specifically, the loading coil should be protected from moisture by the application of several coats of coil dope or by boiling in Paraffin.*—Editor)

Results

I have had well over 150 contacts from my 160-meter mobile station. Normal maximum range is sixty miles, but I have often covered greater distances under favorable conditions. The amount of noise at the other fellow's location has much to do with the maximum distance that can be covered.

Practically speaking, the band is never dead. The only time during which I have difficulty in

MULTI-BAND OPERATION

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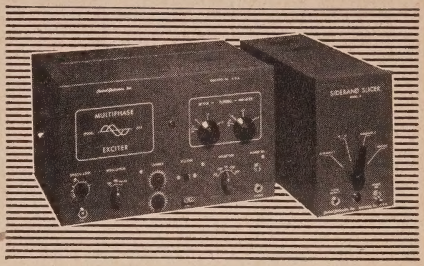

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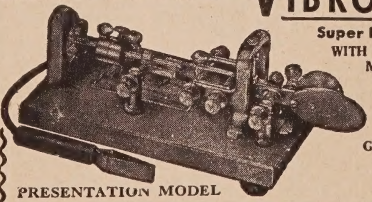

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making contacts is in the evening when the interference is bad on my frequency. With low power, this is to be expected on any band. Power lines beside the road or over the antenna apparently do not decrease the strength of the radiated signal; in fact, they sometimes seem to increase it. However, they sometimes reduce the strength of received signals somewhat. Mobile-to-mobile contacts are as satisfactory as mobile-to-fixed-station contacts.

On receiving, the *Gonset* converter, in conjunction with the automobile receiver, brings in signals as well as my communications receiver connected to the big antenna at home. I receive and transmit slightly better in the direction the car is pointed than in other directions; however, there is no difference in signal strength whether I am standing still or driving quite fast.

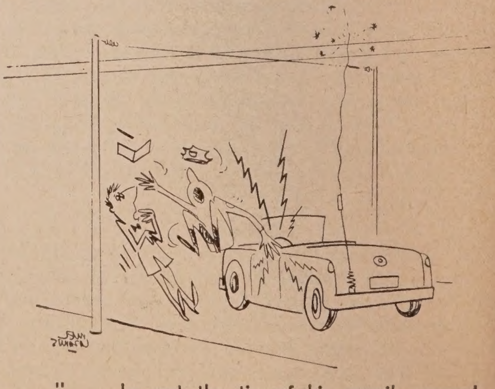
All in all, mobile operation on 160 meters has been very rewarding. This is a very chummy band. Many times on trips the operators I work insist that I stop to meet them and have a cup of coffee. This adds to the pleasure of the trips, but sometimes results in my getting home somewhat later than I expected.

MOBILE MADNESS

(from page 30)

I tried to tell him it was the best spot in town for a QSO and that I got good reports there and didn't have to QRT because of poor readibility, but he didn't seem to understand. When he began humoring me like he thought I was crazy, I shut up. He wet the tip of his pencil, opened his black book and leaned against the car—and promptly did a triple somersault across the street.

The other cop came running from the police car. "What did you do to O'Brien!" he demanded, waving his gun under my nose. He reached for the car door and then he, too, did a triple somersault



". . . he wet the tip of his pencil, opened his black book and leaned against the car . . ."

across the street, landing on Officer O'Brien.

Then I saw that my whip antenna was touching an overhead trolley power line. With the secondary of the antenna coil grounded directly to the car's chassis, that heavy current went to the car's body. No wonder the two cops somersaulted when they touched the car! And no wonder I had such a good signal report—I was using the municipal trolley's power lines for an antenna!

Well, that settled my mobile operating for a while. The judge gave me three months for resisting arrest and assaulting officers with stolen power. I've got a lot of free time in jail, and I've been working out a way I can double the power in my mobile rig. I've got the mobile madness bad now and am impatient to get out and back into the fun again.

TEN IS 1/4 FOR TEN

(from page 41)

simple, but, calculate as I might, the inductance of my 17¾-inch extension always comes out to more than ten times the amount required to cancel out the effects of the capacity to ground.

Whatever necessitates the increase in whip length beyond the calculated length to achieve resonance, it is easy to accomplish. Short the base terminal of the antenna to the car frame, using as short a piece of wire as will allow coupling the grid-dip meter. Then adjust length to obtain a dip on the meter at the desired frequency.*

Further Improvement Possible

After the antenna is resonant at the desired frequency, there is the possibility of further improving its radiating efficiency with the aid of a field-strength meter. W1MAW used the *S*-meter on a receiver across town as a field-strength meter and obtained greatest signal strength with a whip about one foot longer than indicated by the grid-dip meter.

His antenna is a *Radelco* (like W1QEM's) on a frequency of 28.7 Mc., and with an optimum length of nine feet nine inches. Feedpoint impedance measured roughly fifty ohms on an *Antennascope*.

If it is difficult to make the antenna accept power when it is lengthened beyond resonance, tune out the reactance with a midget variable condenser between the base of the whip and the center conductor to the coaxial feed line. Or tune the link at the transmitter. *(If the feed line is of appreciable length, tuning out the reactive component at the antenna will reduce loss in the line, by decreasing line SWR.—Editor.)*

Probably the most important thing to remember is that each rolling Ham shack is a cut-and-try problem. Don't just install a whip antenna and forget it. Play around with it. It will pay off for you.

---

* For a discussion on the use of the grid dipper see "Subject: Grid Dippers," CQ, January 1953, page 12.

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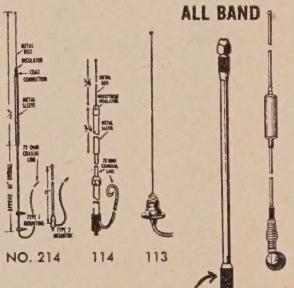

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BARGAINS: New and good clean reconditioned Collins, Hallicrafters, National, Hammarlund, Johnson, Elmac, Gonset, Morrow, Babcock, Harvey-Wells, RME, Millen, Lysco, others. Reconditioned S38 $29.00, S40A $69.00, SX43 $119.00, S76 $129.00, NC57 $69.00, NC125 $129.00, NC173 $149.00, NC183 $199.00, HF-10-20 $49.00, VHF152A $59.00, RME45 $89.00, HQ129X, SP400X, SX71, SX42, SX62, S27, SX24, HFS, NC240D, HRO5TA1, HRO7, HRO50, HRO50T1, HRO60, NC183D, 75A1, 75A2, 32V1, 32V2, 32V3, many others. Reconditioned equipment shipped on trial. Easy terms. Write for information. Henry Radio, Butler, Missouri.

SELL: 400v. 200 ma. 6.3v. 7A power supply in Bud C-1748 cabinet. $15.00; 400v. 400 ma. 6.3v. 6A power supply. $15.00; New Eimac 4-250A, $25.00. W2LFJ, 215 Fobes, Syracuse 6, N.Y.

SELL: Harvey-Wells TBS-50D transmitter with power supply, adapted Johnson Viking VFO, and Stancor clipper-filter $150.00, originally $230.00. Eldico 2-meter transmitter kit, new, still unwrapped $45.00. RME converter 152A with barely 5 hours service $75.00. James Hartshorne, W2RKG, 259 Veterans Place, Ithaca, N.Y.

$700 value imported Hertel & Reuss monocular compound microscope with 5X, 8X, and 12X oculars; 10X, 50X, and 100X oil-immersion objective; right-angled vernier mechanical stage on 360 degree calibrated platform; sub-stage condenser with iris diaphram shutter, and dark-field condenser. Guaranteed superior condition. Swap for Johnson Viking II with VFO or Collins 32V. All inquiries answered. Capt. Atherton, W4RVE, Crime Laboratory, Cp Gordon, Ga.

WANTED: ART-13 Transmitter and Parts. Write B. Spivey, 7013 Rolling Road, Chevy Chase, Md.

QSL's SWL's NEW! Better than ever! The 1953 line of Almar QSL, SWL cards. Samples 10c, Almar Printing Service, 602 Barker Bldg., Omaha, Nebraska.

QSLs—Brownie W3CJI, 3110 Lehigh St., Allentown, Pa. Samples free, catalogue 25 cents.

WANTED—AN/ARC-1 or AN/ARC-3 or Components. Write J. Durrant, 5526 Parkland Court, Apt. 202, Washington, D. C.

WANTED—Top Prices Paid—Navy Selsyns 1DG, IF, 1CT, 1G, 5DG, 5D, 5CT, 5G, 6G, 7G, etc. and BC-348, BC-221, AN/ART-13, AN/ARC-1, AN/ARC-3, AN/APR-4, Electronic Surplus, Lectronic Research, 719 Arch St., Philadelphia.

PRECISION AND CUSTOM BUILT ANTENNAS for any band and frequency. Literature on request. Antenna, Inc., Wakefield, R. I.

FREE LIST: Used Collins, Elmac, Hallicrafters, Hammarlund, Harvey-Wells, Lysco, National, RME, Sonar, etc. Lowest prices. Liberal trades. Dossett W9BHV, 855 Burlington, Frankfort, Indiana.

WANTED: BC-348 Receiver. State price and condition. Write R. Wegelin, 410 Cedar St., N.W., Washington, D.C.

CRYSTALS—CABLES: New band edge crystals for 80 and 40 meters phone and CW, FT-243 holders $1.80 each. Also six cables for PE-103, BC-654-A connection and 4 cables for BC223-A transmitters, $2.75 each. channels, $3.75 each. W6KEG, 2142 Parkway Drive, El Monte, California.

SELL: Hallicrafters SX-42 like new, with special Peerless Hi-Fi output transformer. Operation and maintenance manuals included. Used very little as had other sets. Only $195.00. Dwight Baum, W6FRB, 1011 Oak Grove Avenue, San Marino, Calif.

SELL: CHANALYST UHF CONVERTER $16; Carter dynamotor 500 v. 200 ma. 6 v. $16; surplus dynamotor 200 v. 100 ma. 6 v. $6; M.M. mobile whip 75 M, base $6; Bug $6; BC 454 6 v. less P.S. $16; BC 456 converted 75 M. 6 v. 807's $16; ARC 5 plate SCR modulator 6 v. $6 FOB. W4YNC, 1709-4th Ave. West, Birmingham, Ala.

FOR SALE: Globe King 400-B complete with coils for all bands 10 M thru 80 M. Nice clean xmitter runs a cool 425 watts input. No TVI troubles with this xmitter. Phone or CW No reasonable offer refused. W9OS, P.O. Box 71, Dundee, Illinos.

TRADE: BC-342 and S9 receivers for Dictaphone. W9NVC, 1161 Eaton, Beloit, Wisconsin.

SWAP $1100. for complete ARC-3 in good condition. ARC-1, ART-13, BC-348, BC-342, etc. wanted. A. F. Zaleski, 336 Ellery Ave., Newark, N.J.

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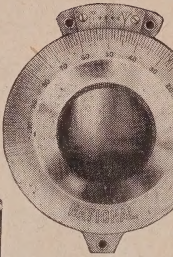
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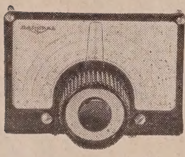
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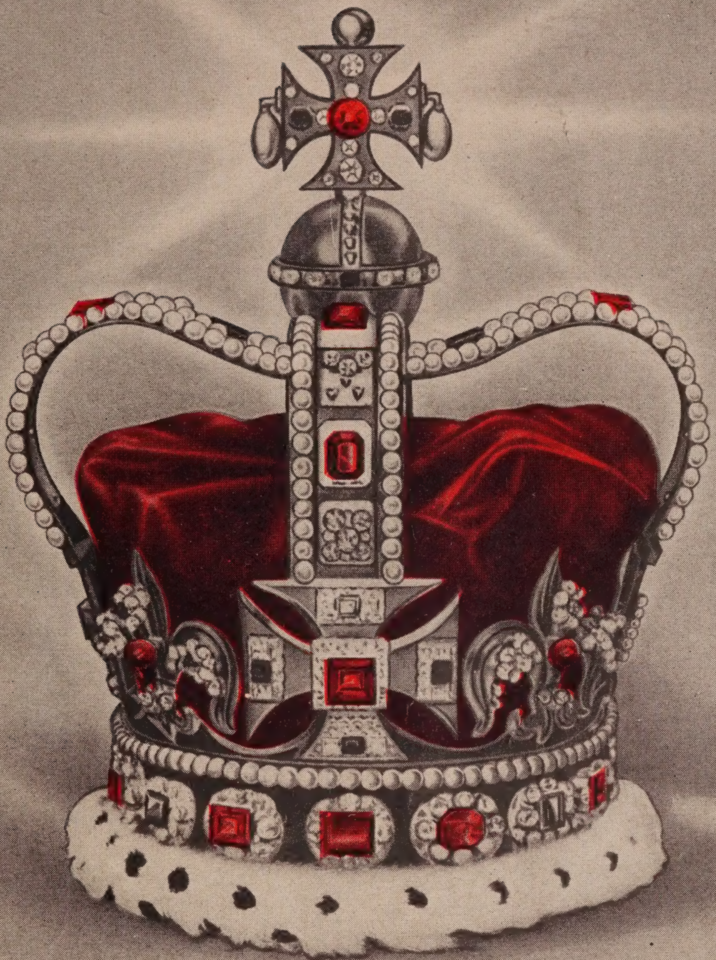

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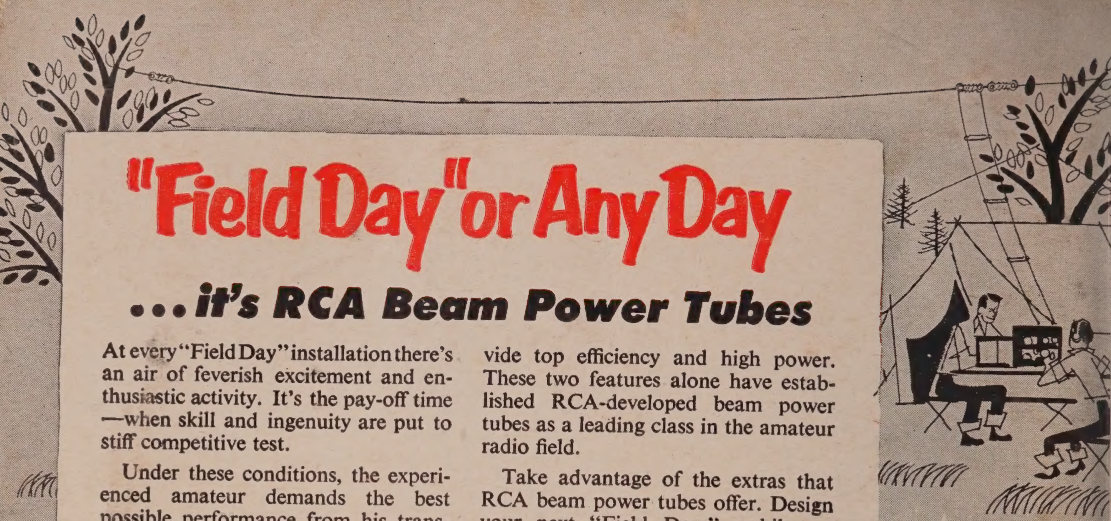

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RCA-829B	750	120	200	1
RCA-5763	350	17	175	3
RCA-6146	750 395	90 60	60 175	2

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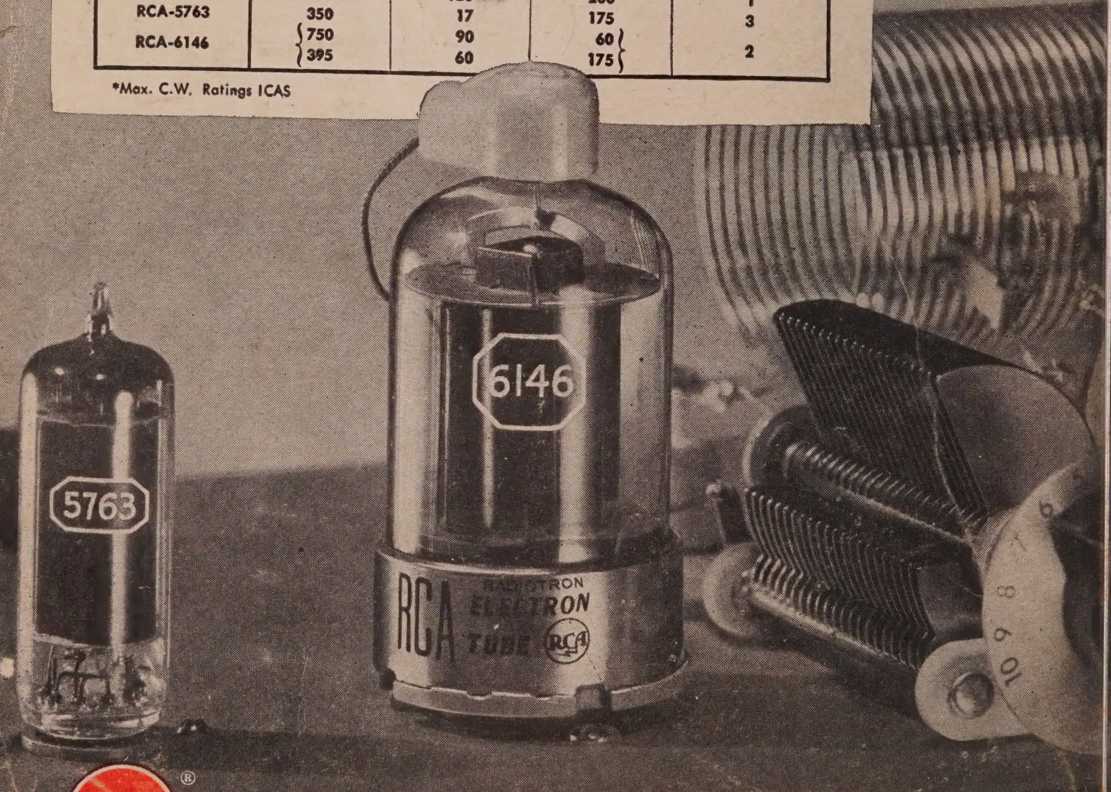

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